Heating and Ventilating

For Engineers and Contractors Controlling the Design, Specification, Installation and Maintenance of Heating, Ventilating and Air Conditioning

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THIS MONTH'S COVER

The new Cincinnati Union Terminal, illustrated on the cover and described on pages 28-32, was designed by Alfred Fellheimer and Steward Wagner, architects and engineers. A. R. Brueggeman Company was the sub-contractor for heating and ventilating work.

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A Survey of Instruments in the Heating Plants of Large Chicago Buildings

By JOHN A. MASEK

INSTRUMENTS for measuring and recording or indicating practically any item of information needed by a building operator have been developed during the past few years. So far as instrument development is concerned there is now no reason whatever why all the desired operating or control instruments cannot be put into a building heating plant when it is built or why they cannot be readily added after it is finished.

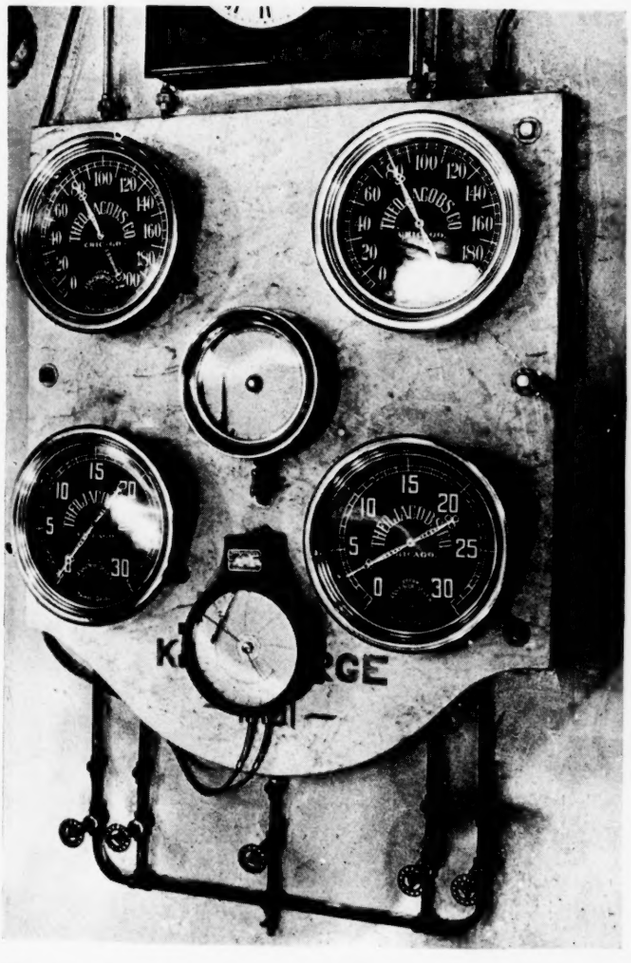
In spite of this state of affairs I have an impression that instruments which could easily pay their cost are not actually put into building plants. Central station plants and industrial processes have been quick to snap up these new instruments as godsends but buildings have held back on their use. This is only an impression received from observing the scarcity of operating instruments in buildings whose boiler rooms or managers' offices I have visited casually.

It seemed to me that it would be a good idea to check up this impression and learn if this was the case in Chicago where buildings are at least as well equipped as elsewhere and where there is just as much incentive to operate building mechanical plants well as there is in other localities.

In addition to this it seemed possible to get a fair understanding of the attitude of operators and managers toward instruments; to find whether operators really use the instruments provided for them, and at the same time to get some interesting photographs showing instruments in their installed positions.

I wanted to inspect a variety of buildings both old and new and large and small and to talk with operators, superintendents and managers, and was prepared to learn that operators absolutely refuse to use the instruments provided or that they pay no attention to them.

(Continued on page 12)



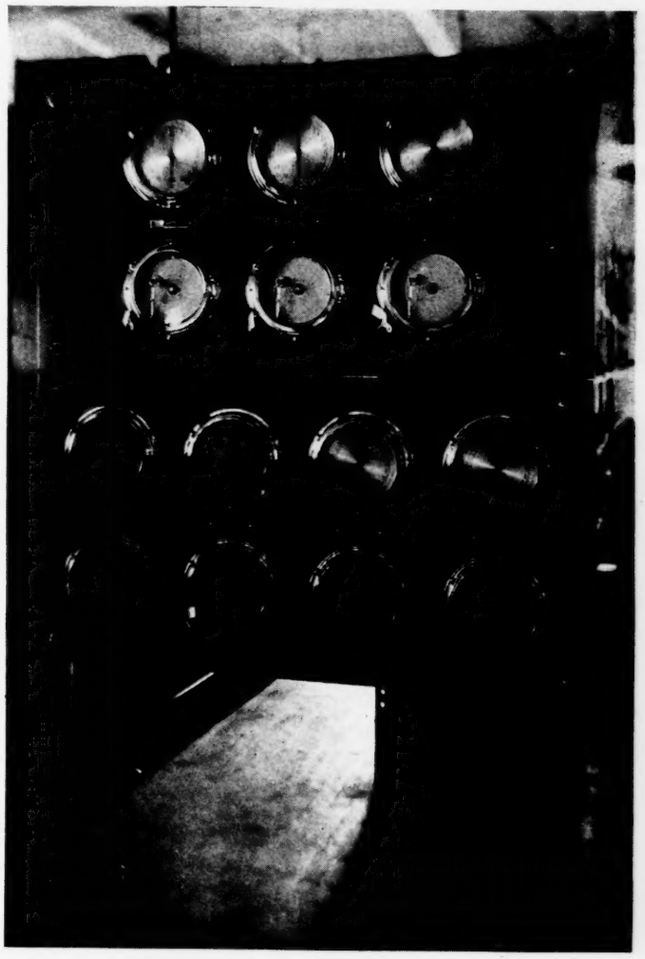
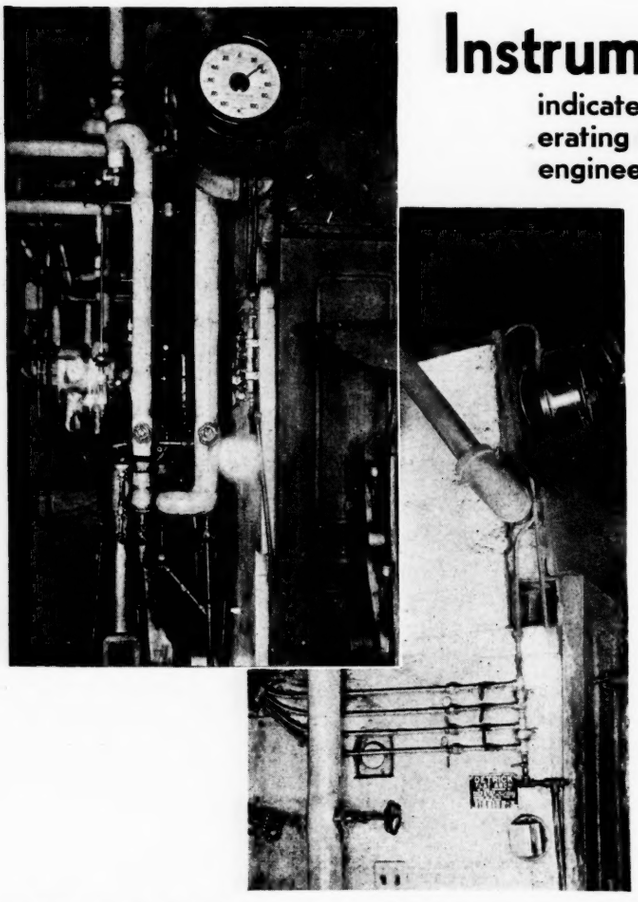


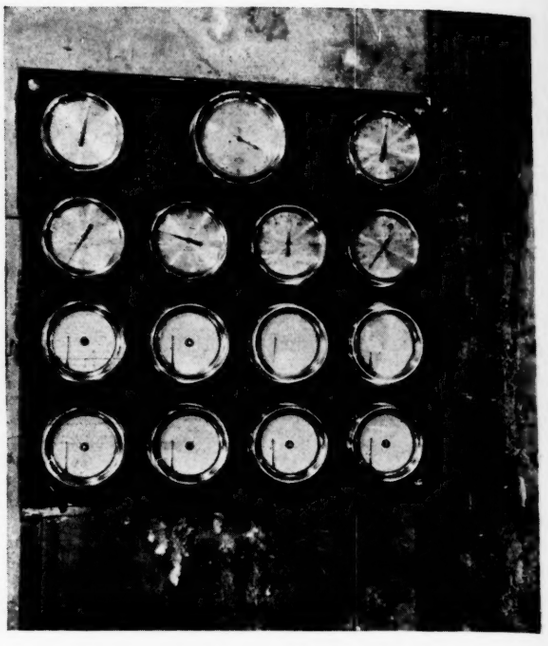
Fig. 1. (Left) The four easily-read steam gauges on this board have been in service for 42 years. The two upper gauges indicate boiler steam pressure, the center gauge is a steam pressure recorder, while the lower gauges indicate the steam pressure in the heating mains. Fig. 2. (Right) A gauge board for a zone-controlled heating system. The compound indicating and recording gauge for each main gives a good picture as to what the steam pressure is in each circuit.

Instruments in the Boiler Room

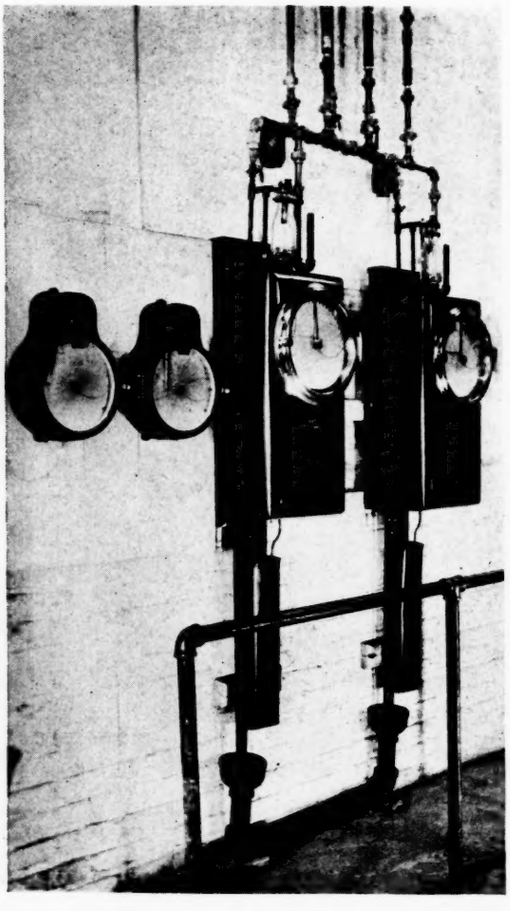
indicate conditions in all parts of the plant, record operating data for permanent reference, conserve the engineers' time and aid in reducing operating costs.



(Above) Two views of an indicating draft gauge on the front of a boiler. The piping arrangement and valve make it possible to test the draft in four sections of the boiler with one gauge.

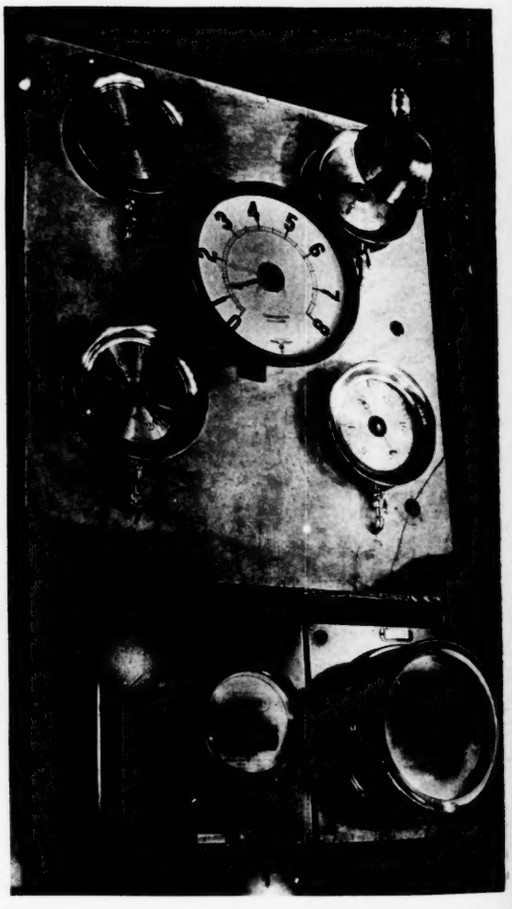


(Above) The gauge board installed in the Chicago Merchandise Mart.

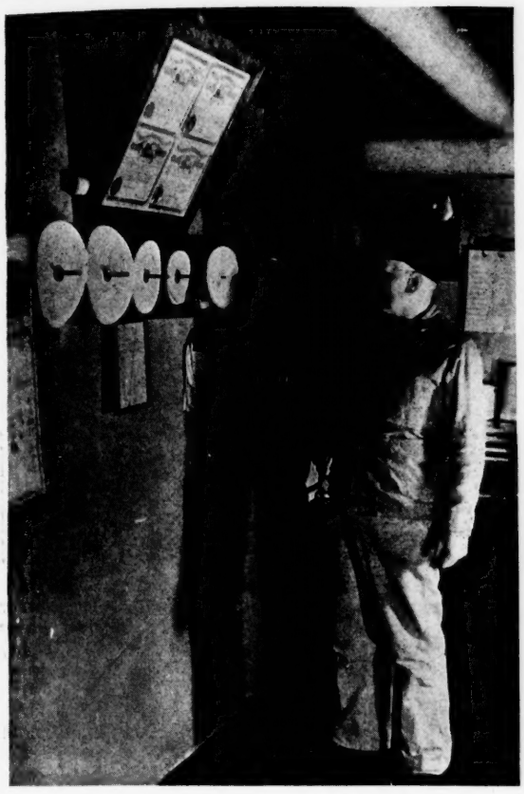


(Left) Two CO_2 meters and two flue gas thermometers connected to a battery of four boilers, two of which are in use at one time.

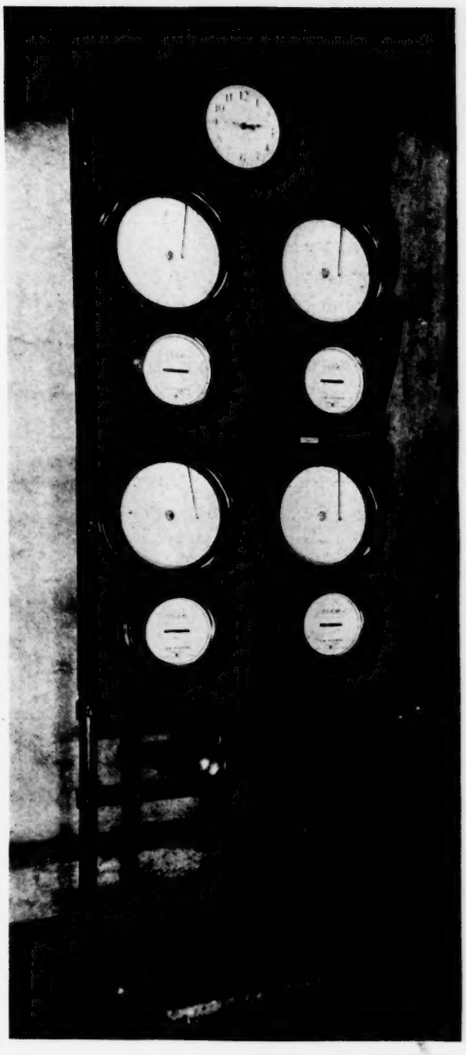
(Right) Steam pressure gauges indicating steam flow meter recorder and integrator. The flow meter was installed five years ago as part of a modernizing project when stokers were also installed. Fuel savings have been estimated at from 10% to 15%.



(Below) Charts removed from recording instruments, conveniently filed on a spindle rack, are a permanent record of performance.

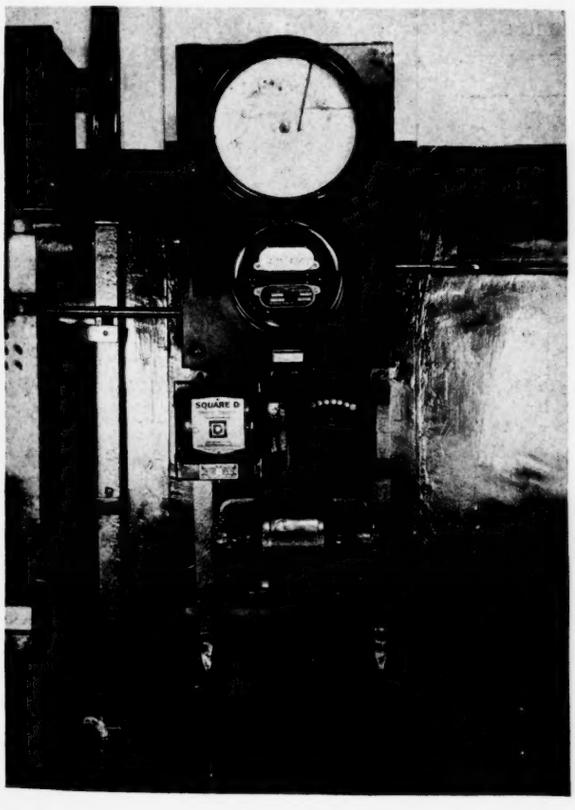


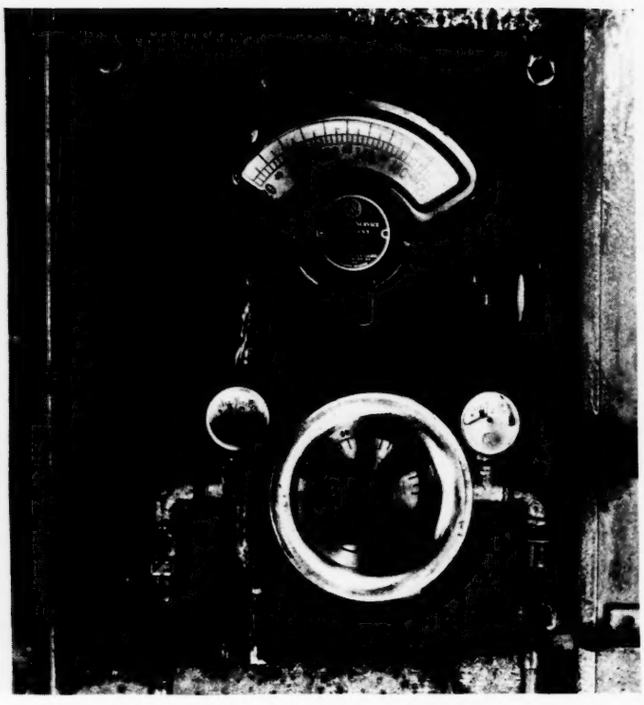
(Above) A typical arrangement of a flow meter with the orifice between the pipe flanges. The manometer shown to the right is located at any convenient point where the U tube can be read.



(Above) A compact instrument panel with a clock and four flow meters and integrators.

(Below) A steam flow recorder and integrator measuring the steam supply to a kitchen.





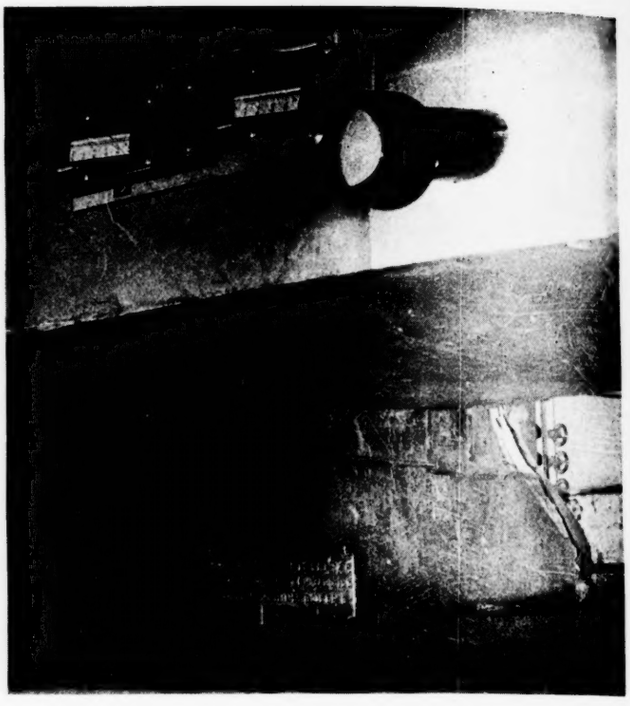


Fig. 3. (Left) An automatic pneumatic thermostat controlling spray water temperature. Water in the spray chamber is recirculated as long as the temperature does not exceed the setting. When it does, the control opens chilled water valves. The dewpoint temperature in the spray chamber is indicated by the instrument at the top. Fig. 4. (Right) The smoke density periscope located in the breeching.

Moreover, I also knew that in the older buildings there would be little if anything beyond a few indicating pressure gauges. Recording gauges were not looked on with favor in the old days and were then of doubtful reliability and accuracy anyway.

The idea also persisted in my mind that there was no use in simply collecting a list of the number of buildings visited, and other purely numerical material, but to learn attitudes toward operating and control instruments and to catch the concensus of feeling.

With this plan all the newest buildings were not deliberately selected nor were those reported to be best operated and managed, but a random selection was made. As a result a number of people were contacted, varied viewpoints were secured, as well as some interesting experiences.

In one building there was a gauge board which illustrated at once both the old and the new. It carried four indicating gauges for showing boiler and heating main steam pressures. They were of large diameter with white letters on a black dial and have given 42 years of satisfactory service. Fig. 1 shows not only these but two recording gauges which were installed recently for steam pressure and outside-inside temperatures. Here on one board were the older indicating gauges still functioning but with recording gauges to supplement them and to furnish a continuous record.

On a zoned job in a recently built building I came across the board shown in Fig. 2. This provides compound indicating and recording gauges for showing the steam pressure in each circuit and lets the operator see at a glance what is going on. The continuous record permits checking at any time.

Fig. 3 is a photograph taken in a building where the automatic instruments shown were used for controlling the spray water temperature being led to the nozzles of a conditioner. The indicating thermometer at the top shows the temperature existing in the air as it leaves the sprays. By setting the thermostat on the bottom instrument at say 40°, the water in the spray chamber is recirculated as long as it does not exceed this temperature. When it does, the pneumatic control valve opens the chilled water supply line. This is a good example of automatic equipment for accomplishing a fairly complicated manual operation.

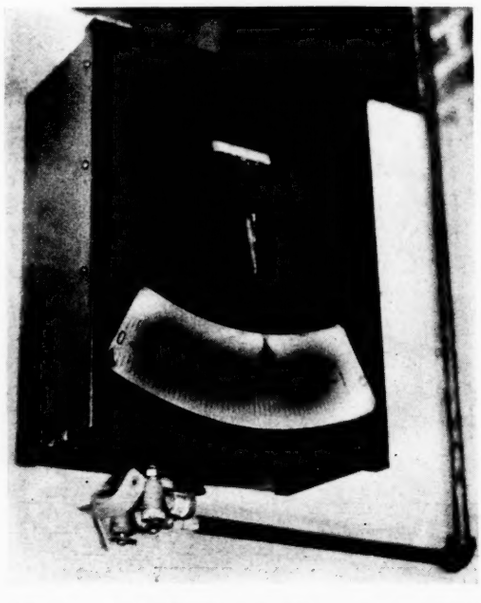


Fig. 5. An indicating draft gauge operated on a float principle. The feature of the dial and pointer is that it is easy to read at a distance.

In the course of the visits a good many boiler-room testing and operating instruments were found in use. Draft and the condition of the flue gas are of such importance in operating that instruments for indicating draft and for analyzing the stack gas are no longer strange in the

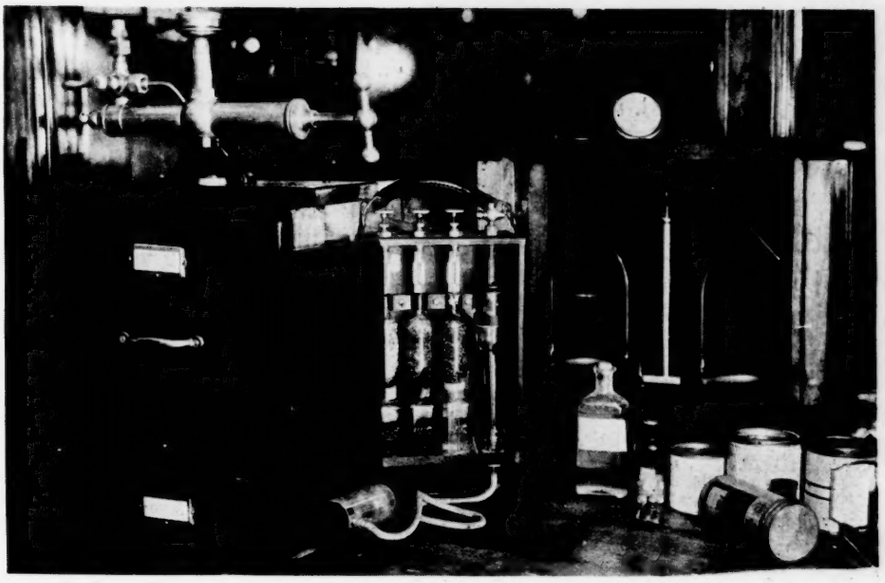


Fig. 6. Some of the instruments needed in a completely equipped engineer's office in a large building. Note the deadweight pressure gauge tester on the filing cabinet. The scale is for measuring chemicals for the orsat apparatus shown in the center.

boiler rooms of buildings. In fact, enough were found so that there seems to be reason to conclude that building operating staffs are no longer set against their use. The pictures of Figs. 4 and 5 are interesting not only because they show two types of draft gauges but also because Fig. 4 shows a smoke density periscope. In Fig. 6 is shown a corner of a testing bench on which the gas analyzer is prominent while a deadweight gauge tester and a chemical balance are also in the background. The well-equipped operating room finds them all useful and necessary to getting good results.

One interesting boiler room installation of pyrometers and CO_2 recorders is shown in Fig. 7. While this general principle of multiple connection is in common use, this installation furnished a good opportunity for photographing. With the connections shown it is possible to obtain a record of the CO_2 in the flue gas from any one of the boilers or from all of them together.

As a result of my calls at many typical buildings there are several impressions which are worth placing on record. One is that if it is true that when instruments are provided the operators do not use them, then I must have found only the exceptional buildings. Not only are instruments used but from talking with the operators it was apparent that they knew what they were there for. Operators without exception were glad

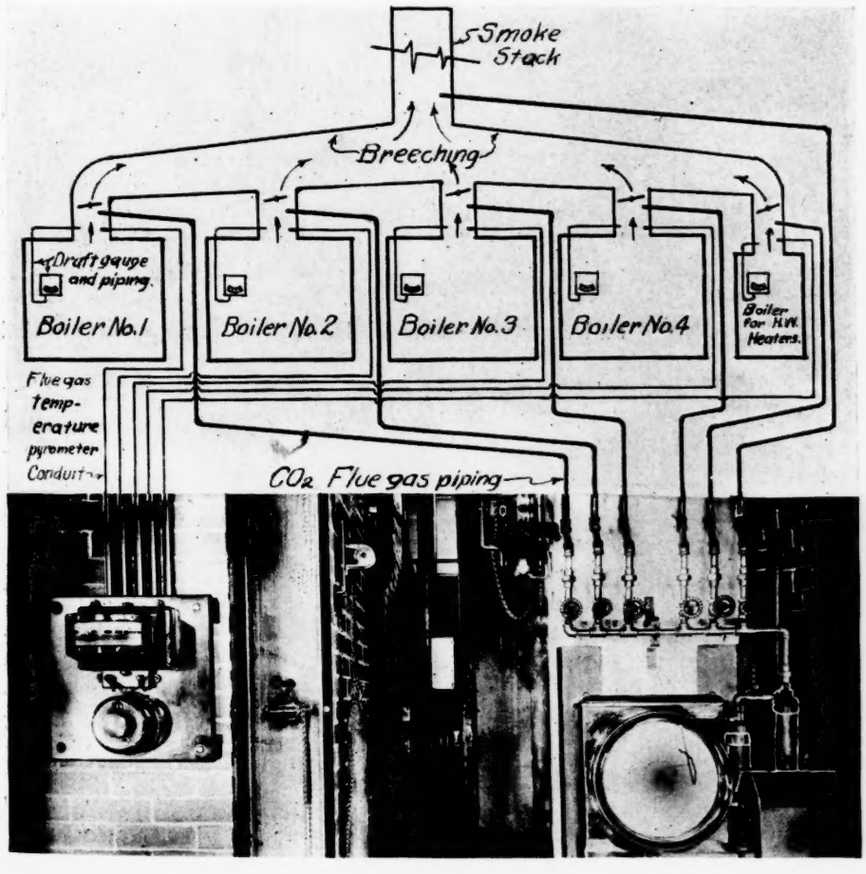


Fig. 7. A pyrometer indicating flue gas temperatures and CO_2 recorder connected to a battery of boilers in a large office building. The various valves at the CO_2 meter enable testing any single boiler at a time.

to talk about how they made use of the instruments provided and even furnished little side-lights on their experiences with them. Some even outlined methods they had developed for making the instruments and the records useful. In one case newspaper weather clippings were pasted to the daily record of the steam flow meter before filing in order that the reported conditions might become a part of the permanent record.

Another point was the interest which managers and superintendents take in the plant operation. Operators with whom I talked were positive of this. They claimed that they are checked up now as never before and that no matter how little interest may have been taken in operation in the boom days, things are different now.

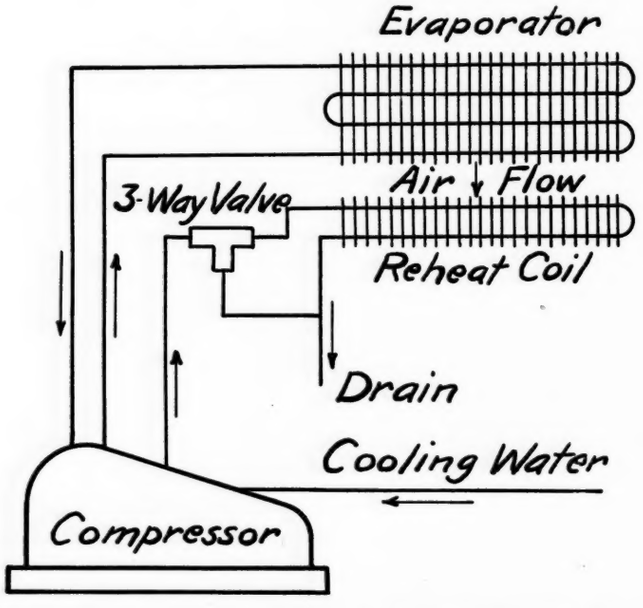
Air Conditioning in the Fur Industry

ALTHOUGH mechanical refrigeration has been used for fur storage, and air conditioning with heat for drying, we believe that the air conditioning system described in this article is the first application of dehumidification and cooling to the delicate dyeing and processing of the more valuable furs.

Heretofore proper treatment of such fur had to wait upon weather conditions of about 80° d.b. and 50% r.h. As the peak of processing and manufacturing in the fur trade occurs during the summer months, when such weather conditions are infrequent, work is often delayed and delivery promises broken while waiting for the numerous hot and humid spells to disappear.

It is well known that hair is hygroscopic. This characteristic prevents the fur from absorbing a sufficient amount of the aqueous solution of dye if the relative humidity of the air in the work room is greater than 50%. Also, if the temperature is above 80° d.b. when the relative humidity is below 50%, the outside hairs of the fur have a tendency to "singe" or curl up with a permanent set that impairs the appearance and value of the fur. Therefore, the problem is to maintain a dry bulb temperature of 75° to 78° with a relative humidity of 45% to 50%.

The apparatus installed consists of a compressor of 3 tons refrigerating capacity connected by direct expansion to an evaporator unit of equal capacity and of the type that is used for air conditioning in stores. Air is drawn in at the back of this unit with a fan and passes through the cooling coil, which lowers its temperature and removes excessive moisture.



Schematic arrangement of refrigerating equipment used in fur-dyeing and processing plant

Then the air passes through another and smaller coil directly in front of the cooling coil. This is a reheat coil and through it the cooling water from the compressor condenser is circulated as in the ordinary dehumidifying unit, the difference in this case being that the flow is controlled by a three-way valve operated electrically by a humidistat. When the relative humidity is reduced to the value indicated by the setting of the humidistat, the three-way valve changes position, permitting the discharge of the condenser water to the drain.

At this stage, the condenser is still kept operating under the control of a thermostat until the desired temperature reduction is obtained, and if this reduction is of such a value as to cause the relative humidity to rise again beyond the desired percentage, the humidistat again takes control and again circulates the condenser water through the reheat coil. When conditions as called for by the settings of both the humidistat and the thermostat are obtained, the condensing unit is shut down.

The room conditioned by this apparatus is L-shaped and includes a space of about 750 sq. ft. with an 11-ft. ceiling. It has four windows and a door along one side, the other boundaries being partitions of ½-in. fibre building board on each side of 2 in. × 4 in. studding with a nominal 4-in. air space between. To prevent excessive infiltration, the larger cracks at the ceiling and floor were plastered and the door openings sealed with felt weatherstripping.

The conditioning unit is suspended about 18 in. below the ceiling. It has two nozzles so that one is directed along each L of the room. The humidistat and thermostat are located almost directly beneath this unit, in the path of the air returning to the unit, which represents the worst condition in the room.

At night this room serves as a drying room for furs treated with water dye by another process outside of the room and brought in at the end of the working day.

As this process adds up to 15 gal. of moisture to the furs, this additional load may prevent the apparatus from maintaining conditions of 80° and 48% during the night, but by morning the furs are dry and room conditions are normal again, ready for the process for which the room was primarily designed.—*C. Boyd Harris.*

Pipe Welding Technique and Fabrication

PIPE welding by the oxy-acetylene process is described in detail in a recently issued copyrighted pamphlet put out by Linde Air Products Company. As some of the material is of such direct application to heating, ventilating, and air conditioning piping we are printing these passages in full. The whole pamphlet is a fine example of carefully prepared data put together in readable and interesting form.

Regarding the fundamentals, welding technique and fabrication of pipe welding we quote, by special permission, as follows:

"The operation of pipe welding by the oxy-acetylene process consists essentially of depositing molten metal from a welding rod upon a molten foundation by means of the heat of the oxy-acetylene flame so that a joint is produced in conformance with the design determined upon. In different words, a flame and welding rod of suitable size and characteristics are used to produce a puddle of weld metal—progressively solidifying—which is manipulated and carried around the joint in a manner that results in deposited weld metal conforming to the joint design determined upon as to cross-section and weld quality.

It is evident that the essential requirement of the welding operation is the application of the oxy-acetylene flame so as to make possible (1) the deposition of weld metal between the surfaces or edges to be joined and (2) the reduction or melting of oxide from these surfaces or edges slightly preceding or simultaneously with the formation or advance of the puddle which solidifies progressively to form the weld metal. The manner in which the flame and welding rod are manipulated to accomplish these requirements is termed the welding technique.

A satisfactory welding technique is always determined by:

(1) the tendency of the molten weld metal or the puddle to seek a lower level due to gravity, and

(2) the forces restraining this tendency, (a) cohesiveness of the puddle, (b) support provided by the base metal and solidified weld metal, (c) pressure of the burning gases against the puddle, and (d) the manipulation of the welding rod in the molten metal.

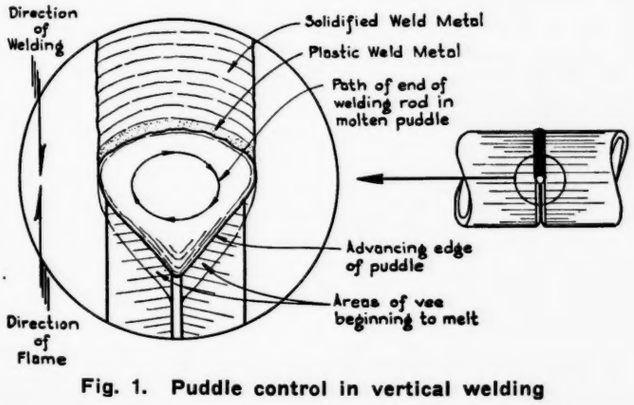

Direction of Welding
Solidified Weld Metal
Plastic Weld Metal
Path of end of welding rod in molten puddle
Advancing edge of puddle
Areas of vee beginning to melt
Direction of Flame

Fig. 1. Puddle control in vertical welding

The action of gravity on liquids requires no explanation, but an understanding of the forces maintaining the molten or liquid metal in the form of a puddle is necessary if the basic principles of welding technique are to be mastered.

The most important force counteracting the effect of gravity is the cohesiveness of the molten metal which determines the quantity of molten metal that will adhere or stick to base metal and welding rod without running or falling. One factor affecting cohesiveness is the amount of heat applied. More heat than necessary increases the fluidity of the molten metal, bringing about a greater tendency of the puddle to run or fall. Another factor is the composition of the molten metal, which is principally rod metal, but contains, to a greater or less extent, some base metal. Certain welding rods contain deoxidizing agents which increase the viscosity or decrease the fluidity of the molten metal, thereby enabling a larger puddle of metal to be carried which is especially valuable in vertical and overhead welding.

Welding directly overhead, it is possible to maintain a surprisingly large puddle of molten metal if just one precaution is observed. Water or oil sprayed lightly on the under side of a flat surface will fall only after a complete drop has taken shape. Thus, if the welding puddle is kept from forming into a drop, cohesion prevents its fall.

When welding vertically, as when bringing a puddle up the side of a pipe joint, the influence of cohesion in maintaining the puddle decreases. This is because the same amount of liquid that could be suspended on the underside of a flat surface will collect and run on a vertical surface. Consequently, the pressure exerted by the burning gases must be relied upon to a considerable extent in maintaining a puddle of fair size. The solidified weld metal just below the puddle acts as a ledge and supplies additional support.

As the welding nears the top of the pipe, the solidified weld metal and the vee of the joint provide more and more support for the puddle while the effect of the flame pressure and cohesiveness in maintaining the puddle becomes greatly reduced. It is at a point near the top that the largest and most fluid puddle can be carried.

If the puddle is started at the top, however, and carried to the bottom of the joint—the reverse of the preceding method—different conditions exist. At the beginning, the vee provides considerable support for the puddle as before but as the side of the joint is approached, the pressure of the flame must be relied upon more and more to keep the molten metal in place.

In this case, where there is no supporting ledge of solidified weld metal to provide partial support, the puddle carried must be relatively shallow to correspond to the holding ability of cohesiveness and flame pressure. To aid in keeping the puddle shallow, manipula-

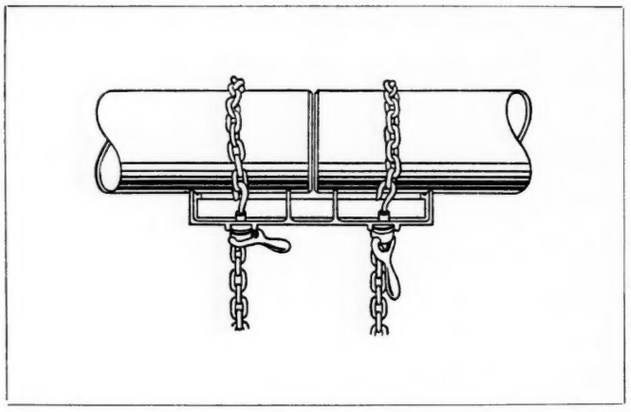


Fig. 2. Adjustable pipe clamp

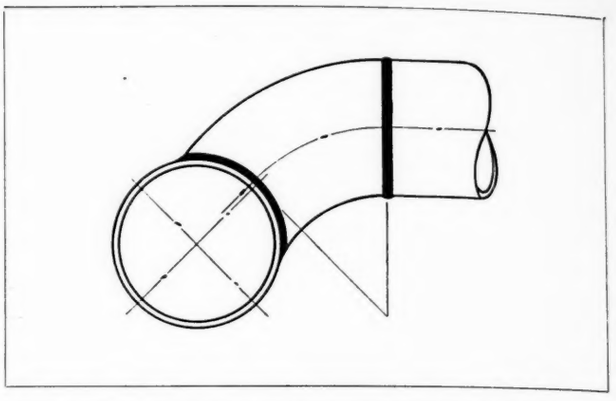


Fig. 3. Elbow welded to upper quarter of header to gain headroom

tion of the welding rod is employed. The end of the welding rod, constantly melting, is used to distribute the molten metal throughout the puddle by a slow but constant movement, circular, elliptical, or in a straight line—so the metal will not collect at one spot and run or fall due to the action of gravity. By this means, the molten metal is 'placed' near the rear edge of the puddle for the short interval required to cool it to a plastic state from which it solidifies quickly to form deposited weld metal as the inner cone of the flame is moved further away. In this manner, weld metal can be deposited rapidly and accurately as to weld cross-section in any position of welding. This is illustrated in Fig. 1.

When the bottom of the joint is reached, the same condition exists as before for overhead welding. The puddle is kept from forming into a drop by means of flame pressure and the welding rod, while cohesion holds it in place. For other positions of welding and other types of joints, the same principles of puddle control apply.

Shop Fabrication. On large jobs, erection can be simplified by fabricating as much of the piping as possible in a field shop near the site of the work. The welding of branch connections, headers, and specials is much more readily done in a shop and when the fabricated piping is taken to the job, tie-in welds are all that are necessary. Unless very accurate measurements are taken from the job for the shop fabrication, a certain amount of lap should be provided at important tie-in joints where a short measurement would require the insertion of an extra piece. Where flanges on a fabricated section are to connect up to equipment whose exact location is not yet fixed, the flanges may simply be tack-welded to the section for ready adjustment in erection.

Frequently, it is advantageous to shop fabricate piping in advance since once erection is started, it can be pushed rapidly. This plan is employed to advantage where conditions on the job are not suitable for fabrication near the final location of the piping.

Fabrication on the Job. On jobs where the piping is fairly simple, or where it is inconvenient to bring in fabricated sections, two general practices are followed. One plan is to fabricate and weld into sections as much of the piping as possible in the most convenient location, generally on the ground or floor. The sections are then raised into position and tie-in welds are made. In this way, the amount of scaffolding required is reduced to a minimum and most of the welding is done in a convenient location where less labor and materials will be required for welding.

Opposed to this is the practice which calls for doing all welding possible in position. Only such welds are made beforehand that would be extremely awkward or impossible of execution in position. This plan is particularly feasible where welding elbows and other welding fittings are employed. In this case only line joints are required in erecting mains and risers and the only cutting necessary is in preparing pipe lengths to size. The making of branch connections, unless for a secondary main or riser of considerable importance, is left for the welder making the tie-in or position welds.

Where this plan is followed, the increased expense of welding in position must be balanced by the more efficient functioning of the erection crew. This crew places the piping in position with but very little preliminary welding or cutting, and after the joints are tack-welded, their work is completed. The welders can follow in behind and do nothing but weld, making up in a measure for the decreased efficiency of position welding.

Tunnel Piping. Piping in long tunnels can generally be joined by rotation welding most of the joints in the final position of the line, unless this is very near

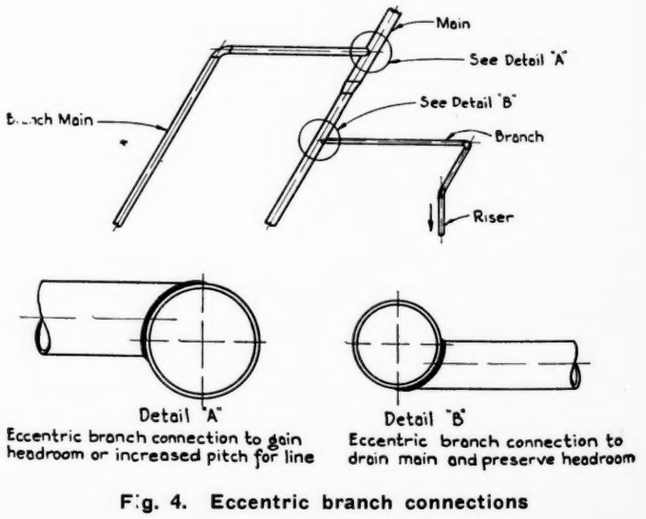


Fig. 4. Eccentric branch connections

the ceiling. In this case, it is best to weld the line on the floor and hoist it into place, making necessary tie-in welds in position. In welding long lines where the joints can be supported directly at the welds by timbers or blocks of wood, dollies or rollers are very useful as a means for lining up and turning the pipe.

Pipe Clamps. As an aid in aligning joints, particularly for position or tie-in welds, clamps are sometimes used. They are not always necessary, but they do make it possible for the tack-welder to work more independently of the main crew.

A fairly simple clamp can be made by using two short lengths of angle iron of the proper size and a chain with a draw-up device such as the flat link chain and screw pull-up used on a pipe vise. The angles are placed opposite each other at the joint and when the chain is wrapped around and tightened the joint is drawn into alignment.

One of a series of adjustable pipe clamps available is shown in Fig. 2. Other clamps in this series are for 90° branch connections, for clamping welding ells to a straight run of pipe, and for clamping welding-neck flanges to a straight run of pipe. These can be left in place while half the joint is being welded, if desired.

Risers. The speedy erection of risers, such as the principal steam riser in a tall office building, is possible if some thought is given beforehand to this phase of the job. The surest method of riser erection is to start at the bottom, adding one length at a time until the top or an offset is reached. The bottom length should be set on a lubricated bearing plate or better yet on a plate turning on ball or roller bearings. The riser can then be turned to suit the convenience of the welder.

Clamps are particularly useful for joint alignment in riser erection. Proper joint spacing is especially essential for horizontal welding so spacing and tack-welding should be given due attention.

It will be found advantageous to use two welders for this method of erection so that the crew placing the pipe will not be delayed. After a joint has been aligned and tack-welded, one welder is assigned to complete the joint while the second welder goes ahead with the erection crew to tack-weld and weld the next joint above, and so on.

Layout. There should be little hesitancy in deviating from customary practices in the layout of piping to get around some construction difficulty, provided of course the permission is obtained from the engineer or owner. Difficulties with lack of headroom can frequently be avoided in the case of boiler headers by welding elbows directly to the top of the pipe or even to the side, coming out at 45° (See Fig. 3). Horizontal branch connections for secondary mains can be made eccentrically at the top of a main to gain headroom or steeper pitch. Riser connections can be taken out of the bottom eccentrically to both gain headroom and drain the main. (See Fig. 4).

Expansion and Contraction. Movements in long runs of pipe due to expansion and contraction are generally allowed for in the design of the piping system through provision of expansion bends or mechanical expansion joints.

For shorter runs of pipe, movements are usually allowed for in the changes of direction at either end of the run. If these changes of direction do not give the desired flexibility, spring pieces can be employed to accomplish this. For example, when connecting a small diameter riser to a main, the branch connection can be made a distance to one side on the main sufficient for the length of spring piece that will take care of the expected riser movement. (See Fig. 4). The spring piece is in reality half of an expansion bend. The action of both in relieving expansion movements depends on the natural flexibility of steel or wrought-iron pipe."

Air Conditioning—
Reference List of Air Filters†

THE Reference List—Air Filters on the following pages summarizes the principal dimensional, rating, and material characteristics of the air filters now available on the market. The list is substantially up to date having been checked within the past 90 days and rechecked to include announcements coming to our attention since that time.

As the filters are being altered from time to time both in materials and in dimensions, care should be used in applying the details. We suggest that after 90 days the manufacturer be consulted each time to learn if the data in the list have been materially modified since its tabulation.

Following vertically down any column shows quickly the variations between models and makes and the range of selection available. Do not overlook the Remarks column, for important comments are included in some cases.

†For a complete discussion of standards of air cleanliness, types of air cleaning apparatus available, principles of air cleaning, filter materials, methods of servicing, methods of arranging in ducts, with numerous illustrations, see "Air Conditioning — Cleaning the Air," HEATING AND VENTILATING, June, 1933, page 13.

REFERENCE LIST

MODEL	AIR CLEANING PRINCIPLE	FILTER MEDIUM	METHOD OF SERVICING	UNIT WEIGHT AND SIZE	
				WEIGHT, LB.	DIMENSIONS—WIDTH, HEIGHT, DEPTH
Type V Multi-Panel	Adhesive impingement	Woven wire panels, corrugated, and covered with baked-on bakelite and fiber, mounted on continuous chains with panels overlapping to form vertical curtain	Self-cleaning by immersion in oil bath	Series 30, 750 to 1070 lb.	17 heights, from 5 ft. to 13 ft.
				Series 48, 994 to 1450 lb.	As required to handle air quantity. Overall depth 2 ft. 2 in.
Unit Type	Adhesive impingement	Expanded metal baffles or crimped wire; viscous-coated	Cleaning, reconditioning and replacement. Viscous material boiled out in cleaning tank, supplied by manufacturer. Units then dipped in oil, drained and replaced	Cell weighs 20 lb., frame 2 lb. Can hold 2 lb. of dust	20 in. × 20 in. × 4 in. overall. 18 in. × 18 in. effective area
Airmat	Passage through dry fibrous finely woven material	Cellulose product, intermediate between paper and cloth. Obtained during rayon process	Renewal or reconditioning. Reconditioned by vibrating or vacuum cleaning. Renewal by replacing with new filter sheet	110 to 170 lb., depending on style of unit. Spare pocket, 15 lb.	27 in. × 27 in. × 27 in. per filter unit
Phoenix	Adhesive impingement	Screen of metal plates edgewise to air stream, with die-formed depressions and ridges oblique to air flow	Self-cleaning. Screen mounted on a chain; dipping in oil bath	Actual weight 1700 to 3500 lb. per unit	4 screen widths—30 in., 36 in., 42 in. and 48 in. Heights up to 15 ft. 2 ft. 4 in. deep
Renu-vent	Adhesive impingement	Split-wire pads woven to uniform size and thickness	Renewal by replacing filter pads	10	20 in. × 20 in. × 3½ in.
American Blower Air Filter	Centrifugal, dry-plate cohesion of dust for dust	Perforated coated aluminum plates	Reconditioning by placing unit frame in an unloader, and tapping	4½ lb. per cell. Holds 2 to 2¼ lb. of dirt before unloading	16 in × 18 in. × 8 in. per cell
Poly-stage	Viscous impingement and centrifugal force	Fine mesh copper wire screen	Self-cleaning. Mesh mounted on a revolving copper screen, dipping in an oil bath. Also a revolving brush and an air spray for cleaning screen	—	Type AO—19 heights from 4 to 13 ft. in 6 in. steps. 2 widths—2 ft. 7 in. and 4 ft. 1 in.
Dry-Fibre—Automatic	Baffle impingement	Wire-woven jute fibre and selected cheesecloth	Automatically-controlled vacuum cleaning	—	Type AD—15 heights from 3 ft. 0½ in. to 12 ft. 11½ in.
Dry-Fibre—Unit	Baffle impingement	Wire-woven jute fibre and selected cheesecloth	Hand-operated vacuum cleaning without removal from frame	—	20 in. × 20 in. area
Annis	Dry type sifting	Special all-wool felt glove removably mounted on rigid wire frame	Filter medium cleaned while in place and in operation with portable vacuum cleaner	25 per unit	20 in. × 20 in. × 6½ in.
Airplex	Passage through closely-woven cotton fabric	Cotton fabric folded back and forth over corrugated stiff paper spacers held in cardboard frame	Complete filter is thrown away, but can be cleaned once or twice before discarded	2	Filter 19½ in. × 19½ in. × 4 in. Steel assembly frame 20 in. × 20 in. × 4½ in.

—AIR FILTERS

CATALOG RATING			REMARKS	MANUFACTURER
CAPACITY, C.F.M.	VELOCITY, F.P.M.	RESISTANCE, IN. WATER		
Varies with each installation	500 through filter curtain	0.35 (average operating)	Also Type S for heavy-duty continuous service. Constant operating resistance, automatically self-cleaning. Overlapping panels spaced 27 in. center to center on chains. Automatic timing control	American Air Filter Co., Inc.
800 per unit	355	Type A-0.25 Type B-0.18 Type C-0.12	Filter material placed in unit with density increasing from front to back; that is, air first passes through coarse material, then through finer and finer material. Type A for high cleaning efficiency, bacteria control; Type B for general ventilation; Type C for low resistance	
1500 per unit, 300 per pocket	43, through filter sheets	0.11 in., at 1500 c.f.m., clean	Filter material treated to give water-proofing. Filter unit contains 5 airmat pockets. A 3-pocket unit also available at 900 c.f.m.	
Varies with each installation	500 at face of filter	0.40 in. (average operating)	Constant operating resistance. Automatically self-cleaning	
800 per unit	355	0.135 (clean)	Units bolted directly together to form filter partition. No frames or supporting members required. Only front pad needs to be replaced. Second pad is moved forward and new pad placed at back of filter	
200 per cell	Nearly 100 on basis of 16 × 18 in. effective area	0.375	Stated that resistance does not build up as cell becomes dirty, and air flow also steady. Maker also offers complete line of air-washing equipment	American Blower Corp.
Varies with each installation. Listed from 2400 to 199,000	488	0.3	Model contains continuous belt of fine mesh wire screen passing over 6 rollers. Continuous service, automatic timing control	Burt Air Filter Co.
Varies with each installation. Listed from 5000 to 190,000	286	0.25, but various densities of fibre can be obtained to vary resistance	Model consists of pad mounted on rollers rotated past vacuum cleaner by operation of vacuum cleaner under time control	
800 per unit	—	0.25 (clean)	Filter pad retained by easily removable rods so that pad may be replaced if necessary	
1000	—	0.25		Coppus Engineering Corp.
800 per unit	20 to 25, through filter material	0.22 (clean)	Maker also offers "Filteraire"—a window unit with fan, 350 c.f.m. Also "Stoppollen."	Davies Air Filter Co.

REFERENCE LIST

MODEL	AIR CLEANING PRINCIPLE	FILTER MEDIUM	METHOD OF SERVICING	UNIT WEIGHT AND SIZE	
				WEIGHT, LB.	DIMENSIONS—WIDTH, HEIGHT, DEPTH
SD-4	Passage through coarsely woven fabric	3 layers coarsely woven fabric, flat layers alternating with crimped layers to form air maize	Renovated by tapping after removal from frame. Then replaced	17 per unit	20 in. × 20 in. × 2¼ in. per unit
Double Duty	Adhesive impingement	Heavy metal sheets, die-pressed into the form of louvers. Metal fins are oil-coated	Self-cleaning metal sheets are mounted on a chain, dipping into oil bath. Motor driven, automatically operated	—	18 heights from 5 ft. 9 in. to 14 ft. 3 in. Width, 2 ft. to 24 ft.
Kom-Pak	Passage through textile fabric	"Filterdown," a fluffy and fibrous cotton material	Dirty material discarded. No renovation. Filter unit removed, and new cloth fed in by lapping back and forth over frame	—	22 in. × 14 in.
Zig-Zag	Passage through textile fabric	Textile fabric reinforced with wire mesh backing	Filter elements discarded when dirty and refill inserted	9 per unit	2 sizes, one 20 in. × 20 in. × 2½ in. One 16 in. × 25 in. × 2½ in.
Fibre-Pak	Passage through dense mass of fibrous material	Vegetable fibre—either dry or oil treated	Fibre element discarded when dirty and refill inserted	—	16 in. × 25 in. × 1½ in. 20 in. × 20 in. × 1½ in. 20 in. × 30 in. × 1½ in.
Kleenaire	Centrifugal, viscous impingement, air reversal	Corrugated woven wire cloth forms zig-zag channels. May be used with viscous substances	Renovated by tapping after removal from frame. By boiling and dipping if used with viscous substances	Series A, 16 lb. Series B, 11 lb.	Series A 20 in. × 20 in. and 16 in. × 25 in. each. 4 in. deep Series B, same as A except 2½ in. deep
Type D	Passage through packed fibre media	Tough, springy, hair-like material, moisture-proof	Cleaned by washing, tapping, or vacuum. Low price permits discarding	5	20 in. × 20 in. × 1½ in. and 16 in. × × 25 in. × 1½ in.
Dustop	Adhesive impingement	Glass wool with solid adhesive substance. Wool graded from coarse to fine	Replacement, no cleaning. Dirty units discarded	2 per unit; 3 lb. per unit, shipping	20 in. × 20 in. × 2 in. 16 in. × 25 in. × 2 in. 16 in. × 20 in. × 2 in.
Vee	Baffle impingement	Galvanized wire cloth packed with hair glass, ¼ in. total thickness	Cleaned with cold or hot water or (for chemical dust) chemical solvent	10	2 sizes, 20 × 20 in. and 16 × 25 in. Both obtainable in depths of 1¾ and 3¼ in.
Protecto-motor	Passage through dry closely-textured pressed felt (dry)	Panels—two steel or aluminum grates support 60 hollow fins or pockets formed of rust resisting wire cloth. Felt drawn over pockets	Vacuum cleaner without removal from frames	18—aluminum filter panel 25—aluminum frame and filter panel	Filter panel 19½ in. × 19½ in. × 6⅜ in. Filter and frame 20 in. × 20 in. × 6⅝ in.
Multi-V-Type (cells)	Passage through dry closely pressed cotton fibres	Dry fabric (closely-pressed cotton fibres) on both sides of a non-metallic gauze-like center	Portable domestic vacuum cleaner with special nozzle	2 oz. to 10 oz. per unit	8 in. × 8 in.; 4 in. × 19¾ in.; 6½ in. × 17¾ in.; 8 in. × 19¾ in.; 8 in. × 23¾ in.; 8 in. × 25 in. Depth all cases, 1 in.
Multi-V-Type (standard panels)	As above	As above	As above	15 20	20 in. × 20 in. × 4¼ in.—12 cell 20 in. × 20 in. × 8¼ in.—8 cell

—AIR FILTERS

CATALOG RATING			REMARKS	MANUFACTURER
CAPACITY, C.F.M.	VELOCITY, F.P.M.	RESISTANCE, IN. WATER		
1000 per unit	416 (based on catalog figure for effective area)	0.2	Also SV, for industrial installations, especially soot-removal; 750 c.f.m. at 0.2 in. water. Also UD-7 for warm air furnaces; 300 c.f.m. per sq. ft. filter area at 0.08 in. water. Also VVC—automatic vacuum cleaned	Greene Gas Cleaner Co.
Varies with height and width of machine	500	0.375 (constant)	Panels rotated on chain, either manually or with power-driven automatic timing control. Capacities listed from 2000 to 300,000 c.f.m.	Independent Air Filter Co.
600 per unit	22½ through filter material	0.15 (clean)	Each installation consists of frame and filter units. Filter unit contains 15 spacers, each 12 in. × 20 in. in size	
800 per unit	50 through filter material	0.1 (clean)	Each installation consists of frame and filter units	
800 per unit	—	0.1 when one unit deep, clean	As above	
800 per unit				
1200 per unit				
100 per unit	400	0.35	—	Kleenaire Filter Co.
800 per unit	300	0.20		
800 per unit	300	0.09 (clean)		
800 per unit	300	0.08 to 0.09 (clean)	Two filters in series—resistance is 0.24 in. to 0.25 in. of water at 300 c f.m.	Owens-Illinois Glass Co.
640 per unit	—			
1000 to 1950	300 to 350	0.125 to 0.130	V-type. Self cleaning if desired by installing water sprays against filter surface. Maker also offers flat type, same material, 800 c.f m. against pressures of 0.10 and 0.12 in. water	H. J. Somers, Inc.
800 per unit	18 through filter material	0.18	Joints of frames are made dustproof by heavy felt carried on each frame. Provision for fastening any number of frames together with bolts and nuts	Staynew Filter Co.
Varies with cell dimensions, and grade of filtering medium	40	Choice of two grades filter material. Resistance varies with grade	Cell units from 1.8 to 6.0 sq. ft. filtering area; 90 to 300 c.f.m. at 0.05 in. water pressure; 165 to 900 c.f.m. at 0.37 in. water. Cell units are built in fibre board frame	
500 to 800	16.7 to 26.7	0.10 to 0.18	Panel models are made up of cell mounted in metal frame and arranged for easy erection. Also a unit 24 in. × 24 in. × 24 in., 6 cells, volumes up to 3000 c.f.m. available, Wt. 65 lb.	
800 to 1200	20 to 30	0.11 to 0.16		

NRA Codes Drawn Up, Hearings Progressing Rapidly, Acceptance Begun

SEPTEMBER has seen the NRA activity at Washington shift back from the President's Agreement and the Blue Eagle to getting the permanent codes fixed up and ready to operate. Hearing has followed hearing. The code-drawing phase is definitely past. The hearing season is on.

During the past month the oil burner code passed through the mill and finally received the approval of the President. It is reprinted in full elsewhere in this issue. The contractor codes were reached for hearing and a blanket form for the whole construction industry was presented and heard. The trade codes—those for wholesalers and dealers— are still up in the air. A number have been submitted but action is delayed, evidently until general principles can be agreed upon. Manufacturer codes are progressing.

Aside from approval of the oil burner code, the manufacturer codes have been rather in the background. The policy is still to handle first the industries which are large employers of labor. However, the manufacturers of cast-iron soil pipe had their code approved September 8. Valves and fittings were reached for hearing September 18, furnace manufacturing September 25, steel and firebox heating boilers September 28. Pumps were included in the code presented by the Hydraulic Institute and scheduled for hearing September 5. As we go to press none of these codes has received presidential approval.

The construction picture is interesting, for during the month the construction side of the building industry has moved a long way toward merging its interests under a single comprehensive code. The possibility of this eventually being the course decided on was suggested in our August and September issues.

On August 8 the Construction League of the United States filed a broadly written code with NRA. This provided that practically *all* construction, including buildings, should be brought under its jurisdiction. Each division at interest was to be allowed to file a supplemental code and to name a committee to administer its own affairs. Bid-Peddling was prohibited. It also set up the usual minimum wage and maximum hour paragraphs. NRA printed the code under date of August 25.

Enough support for this plan was secured so that hearings were set for September 6. At that time significant amendments were submitted. The section which dealt with Bid-Peddling was withdrawn entirely and a wholly new one was substituted. This sets up a detailed statement of the bidding practice to be followed. As amended, Section 10 of this code now reads as follows:

Bid-Peddling Prohibited. **The practice of "Bid-Peddling" by any person as defined in Section 1 of this Code is an unfair trade practice and is prohibited by this Code. Furnishing to any bidder or other person, either directly or indirectly, at any time prior to the publication of the bids, any information, statement, or intimation relative to his own bid, to the bids of others, or to the awarding authority's own estimate is prohibited.**

Bidding Practices. **The following bases of contractual agreements are recognized as fair trade practices; guaranteed price, cost of work plus a fee, unit price, lump sum, and other contractual methods not inimical to the public interest, providing that the regulations contained in this Code of Fair Competition are met.**

It is recognized that the preparation of a bid is a service involving an expense to the bidder, therefore, inviting and receiving of an unreasonable number of bids results in an economic waste. It is recommended that invitations to bid should not exceed six (6) in number.

Wherever the designation "awarding authority" is employed, this refers to architects, engineers, contractors, sub-contractors, or other person who may award contracts or purchase materials for construction purposes and these, therefore, are to carry out all the requirements enumerated below.

(a) Prequalification of competency of bidders to perform the work involved is imperative. No contractor, subcontractor, furnisher of material or equipment, as the case may be, shall be permitted to bid unless he has demonstrated to the awarding authority that he is competent technically and financially to perform the work.

(b) There shall be no collusion between the awarding authority and the seller, nor between the different sellers in the preparation of any bids, nor shall the awarding authority use any bid which he has reason to believe is at or below cost; but where this question arises, the purchaser must give the seller the opportunity of demonstrating by cost sheets or other methods, the correctness of the bid that he has submitted, if he desires its consideration. Collusion in any form is to be considered an unfair practice under this Code and is prohibited.

(c) An awarding authority inviting bids shall make available complete plans and/or specifications and other pertinent information in order that the bidder may prepare a complete estimate or bid in accordance therewith.

(d) An awarding authority shall designate a specific hour and place for receiving and opening of bids. All bids shall be sealed and signed by the bidder or his duly authorized agent. Bids received after the opening of bids shall be returned unopened. Bids received by the awarding authority from uninvited bidders shall be returned unopened.

(e) Supplemental codes shall require that the code authority for each trade shall provide a depository for duplicate bids, and shall require that all bidders file sealed copies of their bids, and any revisions thereof, with such designated depository.

(f) The awarding authority shall make an award or reject all bids, or obtain an extension of time from the bidders, within twenty (20) days after the opening of bids and shall make such award to a bidder, at his original bid price, who has complied with these rules.

The right to reject all bids is reserved to the awarding authority. Where all bids are rejected, bids shall not be again invited or submitted previous to the elapse of ninety (90) days from the date of such rejection, except there be a substantial change in the plans and/or specifications amounting to at least 10% of the previously estimated cost of the work; or, except that there shall be such a marked variation in the bids submitted from the awarding authority's estimate as to the valuation of the work as would indicate to the owner the necessity of new bids in order to secure fair competition. In such contingency the awarding authority, with the consent of the owner, may secure new bids for such work.

(g) The awarding authority in issuing his invitation to contractors on lump sum proposal, will require the list of sub-contractors whom the contractor intends to employ for every division of the work to be submitted with his bid. If, however, the awarding authority does not approve any particular sub-contractor submitted by the contractor, he may reject that bid; but he shall use the bid of some other sub-contractor who has already bid on the work, and the contractor's bid may be increased or decreased in the amount between the bid used and the one rejected. If a contractor uses in his proposal the bid of any sub-contractor for any division of the work; in the event that he is awarded the contract, and if he receives the approval of the awarding authority, he is to award the contract for this particular subdivision to said sub-contractor without further bids for the class of work to be done. Where the contractor contemplates doing the work of any particular sub-division with his own forces, and is qualified to do so, he will so state in his proposal.

All sub-bids should be delivered to contractor 24 hours prior to the delivery of bids to the awarding authority; copies of all such sub-bids shall be delivered at the same time to the various sub-contractor depositories. They shall be opened and made available to the bidders at the same hour as the opening of the lump sum proposals by the awarding authority.

(h) Where a contract is to be executed on other than a competitive basis; such as, cost plus a fee, the owner or his representative shall have the right to approve the list of sub-contractors to be invited to bid, and to approve the sub-contractors to whom the work is to be awarded.

(i) Every rebate, refund, allowance, discount, commission, or service privilege in whatever form shall be extended by vendor to every purchaser under like terms and conditions.

All supplemental codes shall provide for the enforcement of the provisions of this Section 10.

Hearings were held on this code and those of some of the important sub-groups from September 6-11. General contractors, architects, engineers, painting, electrical, marble, cement gun, building granite, and heating and piping contracting groups had all agreed to come under the blanket code and hearings were held on some of their proposals. The plumbing organization asked for a postponement. The plastering code was the subject of a hearing September 18, with the limestone group scheduled for September 19. It is expected that the sheet metal contracting group shortly will come in under the plan.

Thus, as we go to press, the general plan has gained wide acceptance in principle and has had a hearing, as have also the codes submitted by a number of the special groups. It seems apparent that this plan is the one which will be finally accepted by the NRA to govern the whole construction industry. Final action on all the special codes and the blanket code is likely to come at the same time but may be delayed several weeks.

The situation surrounding the code prepared and submitted by the Heating, Piping and Air Conditioning Contractors National Association is of direct interest in this connection. The public hearing on this code was held in the New House Office Building September 11, with Ralph Fogg presiding. A number of amendments to the code as originally filed were offered. These changes were incorporated to bring this code into agreement with that of the Construction League. Several appearances were filed mostly by labor leaders who were not in agreement with details and who proposed changes. As these proposals have not been acted on they are not outlined here.

Among the amendments filed was a section which greatly shortened the original outline of what constitutes bid peddling. With these practices detailed in the Construction League code the underlying codes do not need to contain lengthy statements on the subject.

The definition of what is meant by the field to be covered by the code is interesting. The amended code in Section 1 of Article II states.

Section 1. Heating, Piping and Air Conditioning Division: Heating, Piping and Air Conditioning business consists of selling and/or installing systems, or parts thereof, for steam and hot water heating, ventilating, refrigeration, air conditioning, pipe covering, power piping, industrial process piping, sprinkler piping, temperature control piping, boilers, stokers, oil burners and burner-boiler units, or such other piping or equipment as is installed by steam fitters.

The code is not approved and there is no point in printing it in full until such time as final action is taken.

American Society of Civil Engineers is the sponsoring body for the professional engineers division of the construction industry. It filed a code on August 31. As we go to press no public hearing date has been announced. The original code is set up in seven principal articles, each fairly long. A National Control Committee is provided to enforce the administration of the code. The definition of a professional engineer set up is:

Professional Engineer. **In the meaning and application of this Code a professional engineer shall be considered to be and include an individual, partnership, or engineering corporation legally operating in responsible charge of the design or supervision of construction work; or a person in the employ of the same and who is registered or licensed in accordance with the provisions of law to practice engineering, or any sub-division thereof, within any State or Territory of the United States; or any person admitted to, or eligible by reason of technical training for admission to membership in any national, state, or regional professional engineering organization, in grades which require, as a constitutional provision, active practice as an engineer for not less than 8 years and responsible charge of engineering work for not less than one year; active practice and responsible charge of engineering when functional to the construction industry to be determined as defined in the Constitution of the American Society of Civil Engineers.**

NRA Code of Fair Competition for the Oil Burner Industry

The text of the Oil Burner Code is published here in full, inasmuch as it is the first to be approved for any important branch of the heating industry. It was signed by President Roosevelt September 18.

I. PURPOSE. To effectuate the policy of Title I of the National Industrial Recovery Act, this Code is set up for the purpose of increasing employment, establishing fair and adequate wages, effecting necessary reduction of hours, improving standards of labor, and eliminating unfair trade practices, to the end of rehabilitating the Oil Burner Industry and enabling it to do its part toward establishing that balance of industries which is necessary to the restoration and maintenance of the highest practical degree of public welfare.

No provision in this Code shall be interpreted or applied in such a manner as to promote monopolies or monopolistic practices—permit or encourage unfair competition or eliminate, oppress or discriminate against small enterprises.

II. PARTICIPATION. Each member of the industry, subject to the jurisdiction of this Code and accepting the benefits of the activities of the Code Authority hereunder, shall pay to the Code Authority his proportionate share of the amounts necessary to pay the cost of assembling, analyzing and publication of such reports and data, and of the maintenance of the said Code Authority and its activities; said proportionate share to be based upon value of sales, as the Code Authority, which the approval of the Administrator, may prescribe for each division or sub-division.

III. DEFINITIONS. A. *Classes of Equipment.* For the purpose of the administration of the Code all products of the Oil Burner Industry shall be broadly defined as follows:

Class 1. Domestic Oil Burners which shall be motor driven or otherwise, designed primarily for use with central heating plants in one or two-family dwellings or similar uses.

Class 2. Commercial Oil Burners which shall be motor driven or otherwise, designed primarily for application to the heating plants of multiple dwellings and commercial and public buildings or similar uses.

Class 3. Boiler-burner units which shall be combinations of oil burners and boiler or furnaces, designed primarily for heating domestic or commercial types of buildings or similar uses.

Class 4. Distillate Oil Burners which shall be burners designed primarily for use in connection with cooking ranges, space heaters and domestic water heaters or similar uses as follows:

(a) Conversion burners consisting of distillate burners designed to be installed in cooking and heating units.

(b) Cooking or heating devices manufactured expressly for use with oil burners, the burners becoming an integral part of the unit at the point of manufacture.

Class 5. Industrial burners, which shall be burners designed primarily for producing heat or power for industrial process and/or purposes.

B. *Units of the Industry.* Where used in this Code the following definitions shall apply:

1. Manufacturers are persons, including but not limited to, individuals, partnerships, associations or corporations engaged in the production of oil burners by fabrication and/or assembly.

2. Distributors are persons, including but not limited to, individuals, partnerships, associations or corporations operating under a contract and/or franchise to purchase burners from a manufacturer and whose oil burner business is the sale of oil burners to dealers for resale at retail.

3. Dealers are persons, including but not limited to, individuals, partnerships, associations or corporations operating under a contract and/or franchise with a manufacturer or distributor and whose oil burner business is the sale of oil burners at retail.

IV. *LABOR PROVISIONS.* The following labor provisions are hereby established for the oil burner industry.

(a) Employees in the Oil Burner Industry shall have the right to organize and bargain collectively through representatives of their own choosing, and shall be free from the interference, restraint, or coercion of employers of labor or their agents, in the designation of such representatives or in self-organization or in other concerted activities for the purpose of collective bargaining or other mutual aid or protection.

(b) No employee and no one seeking employment in the Oil Burner Industry shall be required as a condition of employment to join any company union or to refrain from joining, organizing or assisting a labor organization of his own choosing.

(c) Employers in the Oil Burning Industry shall comply with the maximum hours of labor, minimum rates of pay and other conditions of employments, approved or prescribed by the President of the United States.

B. *STANDARD WORK WEEK AND MINIMUM WAGE.*

(a) The Standard work week for the Oil Burner Industry shall be as follows:

1. For manufacturing operations, not to exceed an average of 32 hours per week during the period January to June, inclusive, and not to exceed 40 hours during any one week of that period; not to exceed an average of 40 hours per week during the period July to December inclusive, and not to exceed 48 hours during any one week of that period; a maximum average of 36 hours per week for the period of one year.

2. For the installation and servicing of oil burners, not to exceed an average of 32 hours of labor per week during the period March to August, inclusive, and not to exceed 40 hours of labor during any one week of that period; not to exceed 48 hours of labor in any one week during the period of September to November, inclusive; not to exceed an average of 40 hours of labor per week during the period December to February, inclusive, and not to exceed 48 hours of labor during any one week of that period; a maximum average of 38 hours of labor per week for the period of one year.

3. For office and employees engaged in managerial or executive capacity receiving less than $35.00 per week not to exceed a maximum average of 40 hours per week, averaged over a six months period, and not to exceed 48 hours during any one week of that period.

(b) It is the declared policy of the industry that insofar as consistent with sound business practices, the same personnel shall be kept throughout the year.

(c) The minimum wage rate in the Oil Burner Industry shall not be less than 45 cents per hour. For office or employees engaged in managerial or executive capacity the minimum wage shall be not less than $15.00 per week. This paragraph establishes a guaranteed minimum rate of pay regardless of whether the employee is compensated on the basis of a time rate or on a piecework performance or otherwise.

(d) In the event that any member of the Oil Burner Industry shall also be a member of another industry, such member may, with the approval of the Administrator, pay such wages and work such hours as provided in the approved Code governing such other industry. For purposes of pricing products of the Oil Burner Industry, however, not less than the above minimum wage shall be used as the basis of calculating costs.

(e) No person under sixteen years of age shall be employed in the Oil Burner Industry, provided, however, that where a State law specifies a higher minimum age, no person below that age so specified by such law, shall be employed in that State.

V. *COST PROVISIONS.* ..No member of the Oil Burner Industry shall sell or exchange any product of the industry at a price below his own individual cost as determined by a standard cost accounting system to be set up by the Code Authority for the Oil Burner Industry, subject to the approval and supervision of the Administration; (a) Pursuant to the above provision, the Code Authority shall endeavor to develop and submit to the administrator for approval within 120 days after the effective date of this Code a uniform system of cost accounting designed to make possible the accurate determination by each member of the industry of his own individual cost.

Upon approval by the Administrator of such system of cost accounting, complete advice concerning it shall be distributed by the Code Authority to all members of the Oil Burner Industry. Thereafter, no member of the industry shall sell or exchange any product of the industry at a price below his own individual cost.

(b) Since it has been the general recognized practice of the Oil Burner Industry to sell products on the basis of printed net price lists or price lists with discount sheets and fixed term of payment which are distributed to the trade, each member of the Oil Burner Industry shall, within five days after the effective date of this Code, file with the Code Authority of the Oil Burner Industry, a net price list or a price list and discount sheet as the case may be, individually prepared by him, showing his current prices or prices and discounts and terms of payment. Revised price lists with or without discount sheets, may be filed from time to time thereafter with the Code Authority by any member of the industry to become effective upon a date specified by such member of the industry, which date shall be not less than ten (10) days after the filing of such revised prices at the office of the Code Authority, and copies thereof, with notice of the effective date specified, shall be immediately sent to all known members of the industry, who may file, if they so desire, revisions of their price lists and/or discount sheets, which, if filed not less than five days previous to such effective date, shall take effect upon the date when the revised price list or discount sheet first filed shall go into effect.

If the Code Authority shall determine that any member of the industry is not selling its products on the basis of price lists, with or without discount sheets, with fixed terms of payment and that a system of selling on net price lists or price list and discount sheets should be put into effect, then such member of the industry, within ten (10) days after notice of the decision of the Code Authority under this paragraph, shall file with the Code Authority net price lists or price lists with discount sheets, containing fixed terms of payment; such price lists and/or discount sheets and terms of payment may be revised in the manner herein above provided. However, it is provided that the determination of the Code Authority as aforesaid shall be subject to the approval of the Administration.

(c) No member of the Oil Burner Industry shall sell or exchange any product of the industry at prices lower or discount greater or on more favorable terms of payment than the approved schedule of such member on file at the office of the Code Authority as above provided.

(d) It is hereby provided that the operation of the foregoing provisions in regard to price lists shall at all times be subject to the approval of the Administrator and, if it be the belief of the Code Authority or of any member of the industry that any price list submitted represents sales below the cost of the member submitting same, the date of effectiveness of such list shall automatically be delayed an additional ten (10) days in order that an investigation may be made, by the Code Authority, to determine the propriety of such objection. If it is found or determined by the Code Authority that said prior list represents figures below cost, as defined by the Code Authority and approved by the Administration, such price list shall be withdrawn and revised price lists submitted.

VI. *INDUSTRY REGULATIONS.*

1. Fraudulent and deceptive practices, false or misleading advertising, mislabeling, misbranding or the removal of manufacturers' labels, is unfair competition.
2. The misappropriation of a competitors' business by inducing breach of contracts, espionage, piracy of styles or designs, imitation of trade names is unfair competition.
3. Defamation of competitors or of competitors' products is unfair competition.
4. The sale of oil burners or oil burning equipment below cost and/or below published prices filed with the Code Authority, as herein provided, is unfair competition.
5. The giving of secret rebates, special services, discounts, free display units, or advertising allowances in excess of an amount equal to that expended by a dealer for local advertising and not in any case in excess of $10.00 per burner sold, or the providing for the absorption of transportation costs, is unfair competition.
6. Commercial bribery, in the form of gratuities to salesmen or employees of distributors or dealers or the offering of rewards or premiums to purchasers of oil burners, or the payment of permit and/or inspection fees, or the giving away or selling of fuel oil at less than the prevailing market price in the territory, is unfair competition.
7. The acceptance of monies from fuel oil suppliers by oil burner distributors, dealers, or manufacturers for fuel oil delivered to users of the particular make of oil burner, where the oil burner distributor, dealer, or manufacturer does not secure the signed contract for the fuel oil, is unfair competition.
8. Trade in allowances for a burner greater than the scrap value thereof, or in excess of $25.00 for class 1 or 2 burners or in excess of $1.50 for class 4 (a) burners, is unfair competition.
9. The retail sale of oil burners on time payments extending more than nine (9) months, which carry financing terms more liberal and/or charges more liberal than 80 per cent of the charges made by reputable financing institutions, whose principal business is the discounting of installment contracts, is unfair competition.
10. Rendering service for class 1, 2 or 3 burners beyond the first year after date of installation for less than $10.00 per year, replacement of parts extra at not less than cost, is unfair competition.
11. It is unfair competition to negotiate or enter into distributor or dealer contracts and/or franchises which do not include uniform clauses;

A. Between class 1, 2 or 3 manufacturer and distributor; class 1, 2 or 3 manufacturer and dealer; or between class 1, 2 or 3 distributor and dealer, providing as follows:

(1) That violation of the Code for the Oil Burner Industry will make the contract and/or franchise subject to immediate concellation.

(2) The following standard guarantees:

(a) The manufacturer guarantees all parts of the equipment shipped under this agreement for one year (and no longer) from date of installation thereof against defective material or workmanship (but not against damage caused by accident, abuse or faulty installation) when the equipment is installed in accordance with the manufacturers specifications, and will repair or replace free of charge, f.o.b. factory, all such defective parts if returned to the factory, charges prepaid. The manufacturer's liability for damages caused by any such defective parts shall be limited to such repair or replacement and in no event shall the manufacturer be liable for indirect or consequential damages.

(b) The dealer agrees to guarantee to all of his customers who purchase oil burners from him, free service, day and night for at least three (3) heating service months, and not more than twelve (12) months from date of installation, and free replacement of parts due to defective material or workmanship for a period of one year from date of installation, unless waiver of this provision be secured from the purchaser in writing at or before the time of sale.

B. Between Class 4 manufacturer and distributor; class 4 manufacturer and dealer; or between class 4 distributor and dealer, providing as follows:

(1) That violation of the Code for the Oil Burner Industry will make the contract and/or franchise subject to immediate cancellation.

(2) The following standard guarantee:

(a) The manufacturer guarantees all parts of the equipment shipped under this guarantee for one year (and no longer) from date of installation thereof against defective material or workmanship (but not against damage caused by accident, abuse or faulty installation) when the equipment is installed in accordance with the manufacturer's specifications, and will repair or replace free of charge, f.o.b. factory, all such defective parts if returned to the factory charges prepaid. The manufacturer's liability for damage caused by any such defective parts shall be limited to such repair or replacement and in no event shall the manufacturer be liable for indirect or consequential damages.

VII. *ADMINISTRATION OF CODE.* To effectuate further the policy of the Act, a Code Authority is here-

by designated to cooperate with the Administrator as a Planning and Fair Practice agency for the Oil Burner Industry.

This Code Authority shall consist of twelve (12) members as follows:

(a) Five members who shall be members of the Executive Committee of the American Oil Burner Association, Inc.

(b) One member who shall be the chairman of the Board of Governors of the Dealer Division of the American Oil Burner Association.

(c) One member who shall be the President of the Distillate Burner Manufacturers Association or his nominee.

(d) One member who shall be the President of the Pacific Coast Oil Burner Association or his nominee.

(e) One member who is not a member of any of the above Associations and who shall be selected by the Administrator.

(f) Three non-voting members who shall be appointed by the Administrator.

1. The Code Authority may present to the Administrator recommendations based on the conditions in the industry as they develop from time to time which will tend to effectuate the operation of the provisions of this Code and the policy of the National Recovery Act. In addition, it shall have the power to require from time to time such reports from the industry as in its judgment may be necessary to advise adequately on the administration and enforcement of the provisions of this Code in cooperation with the Administrator.

1a. In addition to the information required to be submitted to the Code Authority there shall be furnished to government agencies such statistical information as the Administrator may deem necessary for the purposes recited in Section 3(a) of the National Industrial Recovery Act.

2. To provide data necessary for the administration of the National Industrial Recovery Act, the members of the Oil Burner Industry shall furnish to the Code Authority such information as it may require from time to time but through such channels as to eliminate the identification of any individual company's confidential information, subject to the approval of the Administrator.

3. Where the costs of executing contracts entered into in the Oil Burner Industry prior to the approval of the President of the United States of this Code are increased by the application of the provisions of that Act to the Industry, it is equitable and promotive of the purposes of the National Industrial Recovery Act that appropriate adjustments of such contracts to reflect such increased costs be arrived at by arbitral proceeding or otherwise, and the Code Authority of the Oil Burner Industry is constituted an agency to assist in effecting such adjustment.

4. This Code is hereby declared subject to the power of the President, pursuant to Section 10(b) of Title 1 of the National Industrial Recovery Act, from time to time to cancel or modify any order, approval, license, rule or regulation, issued under said Title and specifically, but without limitation, to the right of the President, to cancel or modify his approval of this Code, or any condition imposed by him upon his approval thereof.

5. This Code shall be in effect beginning five (5) days after its approval by the President of the United States.

Heat Not Solely Responsible for Sensation of Warmth

FINDINGS contrary to the accepted theory that the sensation of warmth is caused by a certain increase in the temperature of certain responding sense organs were presented before the recent annual meeting of the American Psychological Association by Dr. Florien Heiser, Yale University.

In Doctor Heiser's experiments warmth stimulation was applied at a temperature of 101° and a pressure of two grams at 1470 points on the foreheads of two trained laboratory subjects. Each point was stimulated twice with each of four stimulus durations, respectively, one-half, one, two, and four seconds. The experiments showed no significant differences between the numbers of warmth sensations experienced at the different stimulus durations, which, Doctor Heiser points out, would be the expected result if the sensation of warmth is caused by increase in temperature of responding sense organs, since the sensations would increase proportionally with the duration of the warmth stimulation because of the greater time allowed for the conduction of heat to the sense organs. The results of these experiments were not in accord with two previous investigations in which the converse was indicated.

The recent experiments indicate that either the sense organs are at the surface of the skin, or else that it is not heat conducted from the stimulus to sub-cutaneous "receptors," or nerve ends which convey the sensation to the brain. Thus, the generally accepted theory which states that the skin receives its sensations through certain localized spots, the spots differing for different sensations, is contradicted. Nerve receptors beneath these spots were assumed to complete the old theory, but their actual existence has never been demonstrated, according to Doctor Heiser.

Heating and Ventilating the New Cincinnati Union Terminal

By LESLIE J. HART†

THE recently completed Cincinnati Union Terminal was built to replace five old stations scattered at various points about the city. The new station provides passenger facilities for all of the seven railroads entering Cincinnati.

Prospective passengers wishing to use the station will arrive, if on foot or in a private automobile, at the main entrance in the center of the facade; if in a taxicab or bus they will arrive under cover in the wing to the right. Alighting from a public vehicle they will walk up a ramp to the main concourse floor, while the vehicle will continue under the main floor to a similar wing on the opposite side for taking on departing passengers.

The main concourse is a room generally semi-circular in plan with a half-dome ceiling and a semi-circular side with the large window visible from the front. The room therefore approximates a quarter-sphere. The ticket office is to the right and occupies half of the semi-circular wall. The opposite side contains the offices of the telegraph company, the entrance to the lunch room and restaurant, a soda fountain, drug store, and telephone facilities. On either side of the center entrance there are small shops.

Through the axis of the building passengers continue past the baggage and parcel checking lobby to the train concourse from which they will gain access to a stair or ramp to the train platforms below. The terminal is built on the through-station principle and the tracks and platforms pass at right angles under the train concourse.

The main concourse and train concourse are rooms of large volumes presenting unusual requirements in the way of heating and ventilating apparatus. This article will be largely limited to an attempt to describe these rooms and the conditions leading to the solutions reached.

The Train Concourse

The train concourse presented the greatest difficulty in the way of heating of any section of the entire station design. It is approximately 450 ft. long by 78 ft. wide by 37 ft. high; it is exposed on roof, floor, and all but one side; it contains 16, four-door-wide vestibules opening to the ramps and stairs below, and as it serves as waiting room it must be maintained at nearly 70°. Further, in order to minimize the length of stairs and ramps to the platforms it was desirable to keep the floor of the train concourse as close to the platform level as possible and no space could be provided in the floor construction for steam lines or other heating arrangements.

It was finally decided to resort to a fan-driven indi-

†Engineering staff, Alfred Fellheimer and Steward Wagner, architects, New York.

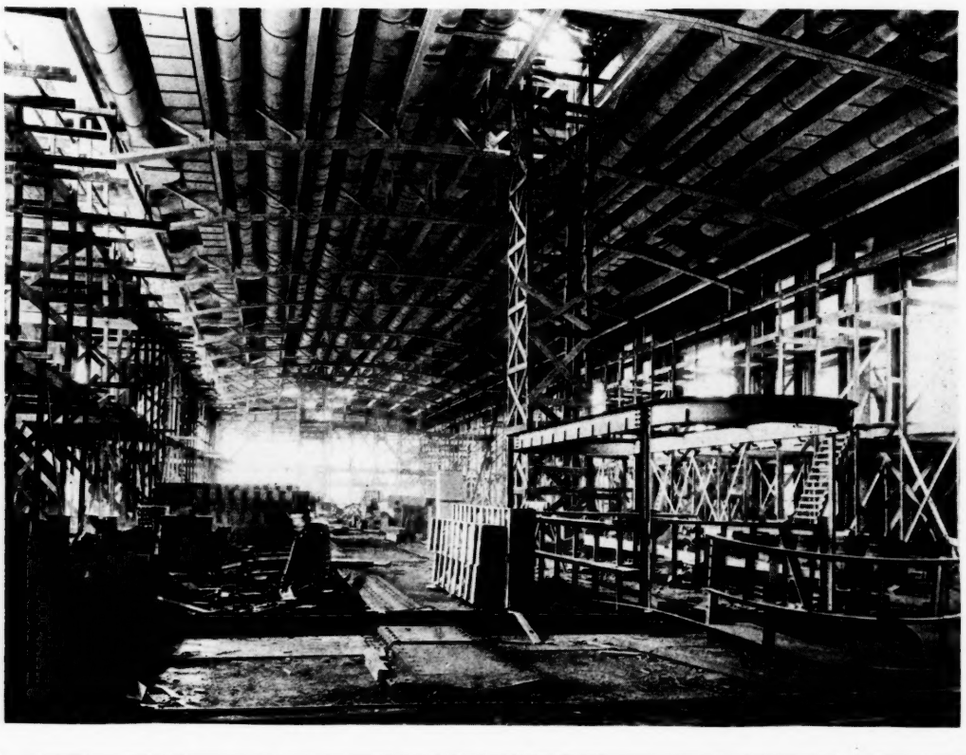


Fig. 1. Train concourse under construction. Note the arrangement of ducts in the spaces between truss members. The two center ducts are 52 in. in diameter and supply the tempered air through the combination grille and lighting fixtures.

rect system with distributing ducts concealed in the ceiling space below the roof.

For this purpose a fan room was provided at the level of the ceiling space and at the end adjoining the main concourse and the building proper. This location made for the shortest duct runs and eliminated any large vertical flues. It was also almost directly over the point of steam entry to the building and thus minimized the length of the steam lines.

This fan room contains four electric motor-driven fans, each of 25,000 c.f.m. capacity. Two of these fans handle air taken from a duct system connecting the grilles located near the floor and midway between platform entrances. This air is then heated—in severe weather up to 125°—and returned to the room through grilles in the soffits immediately over the entrance doors, thus blowing down over the faces of the doors. The duct systems are so arranged that the return air grilles at the near end of the concourse are connected to the fan supplying hot air to the soffit grilles at the far end, permitting a partial circulation with one unit.

The other two fan rigs are straight air supply units, utilizing fresh air, filtered and tempered to room temperature, and discharged into the room through combination lighting fixtures and grilles located in the ceiling on the axis of the room. Here, again, provision has been made for operating one fan unit separately. In this case the grilles are divided in half and each half is connected to a duct system supplied by one fan. This arrangement permits full discharge velocity over half the grille area during partial operation, and in this instance the discharge velocity is considered important.

The air supplied through these ceiling grilles and its point of introduction into the room are highly important. First, the excessive supply tends greatly to reduce infiltration, through the numerous vestibules, especially during train-arrival periods when both sets of doors will be more or less open; second, it creates an air flow into the adjoining main concourse and thence into the main toilet rooms, lunch room, and restaurant, which necessarily are provided with excessive exhaust, and third, it breaks up the stratification of overheated air which would naturally occur were no such supply provided.

For summer use the two recirculating heating fans are arranged with dampers so that the warm-air distributing ducts are shut off and the air discharged to the outside atmosphere, thus providing normal exhaust.

All of the main ducts for the above described systems were run in the ceiling space formed by the lattice roof trusses. In order to gain the greatest available duct area in the triangular voids formed by the truss members a large number of the ducts were made circular in shape.

Vestibules to Platforms

As previously stated there are 16 entrances from the train concourse to the ramps leading to the various train platforms. At the points of entry double sets of doors are provided which form vestibules. Each of these vestibules is equipped with a schoolhouse-type unit ventilator operating wholly recirculating. These units are housed behind double width, full height doors with grilles near the bottom to act as recirculating inlets. The outlet grilles are over the door heads and are connected to the units by short ducts. This arrangement makes it possible, by opening the doors, to gain access to the entire fronts of the units.

Steam to these units is supplied from mains in the train concourse ceiling space and as it was impossible to provide return piping an unusual method of disposing of the condensate was devised. Under the regular finned heating surfaces in the units secondary surfaces were provided in the inlet air stream and the units were so piped that the trap discharge of the regular

Fig. 2. Train concourse completed. Tempered air is supplied through the combination grilles and lighting fixtures, while warm air enters over the platform entrance doors. Return air grilles are midway between the platform entrance doors.

heating surface would pass through the secondary surface and be cooled by the incoming room temperature air. From the secondary coil the condensate is wasted to nearby leaders.

While the saving in heat by such an arrangement is probably negligible it at least overcomes the criticism that would follow if steam vapor issued continuously from the roof drains.

It is intended that the blowers in these units will be operated only at train arrival and departure times when the vestibules are in use; at other times the natural circulation through these units will take care of the heat losses. The start and stop buttons, therefore, are incorporated under the panel controlling the platform lighting.

Main Concourse

The main concourse already described as quarter-spherical in shape adjoins and connects to the train concourse without dividing doors or vestibules. It is roughly 175 ft. in diameter and 106 ft. high to the loftiest point.

To even the careful observer the main concourse would appear to be without any means of heating either in the form of indirect outlet grilles or radiators, except for small grilles inside the side entrances and exits, and these would appear to be obviously too small. Actually, this very large space is heated by blanketing, that is, all exposed surfaces where heat loss would occur are double and the intervening spaces are heated.

The entrance, main, and exit vestibules, which are the principal sources of outside air infiltration, are each heated by individual fan-driven indirect systems. These fan units are located remote from the vestibules and the hot air is conveyed to the outlet grilles through duct systems. In order to build up a slight pressure and thus minimize the inrush of outside air these units supply fresh air rather than recirculated air taken from the same space. In the case of the entrance and exit vestibules, grilles directly inside the inner doors are also connected to the indirect systems. These are the grilles referred to above as being the only visible heat sources in the main concourse.

The large window in the main facade of the building consists of two glass surfaces with glass walkways at the floor levels. Thus there are formed

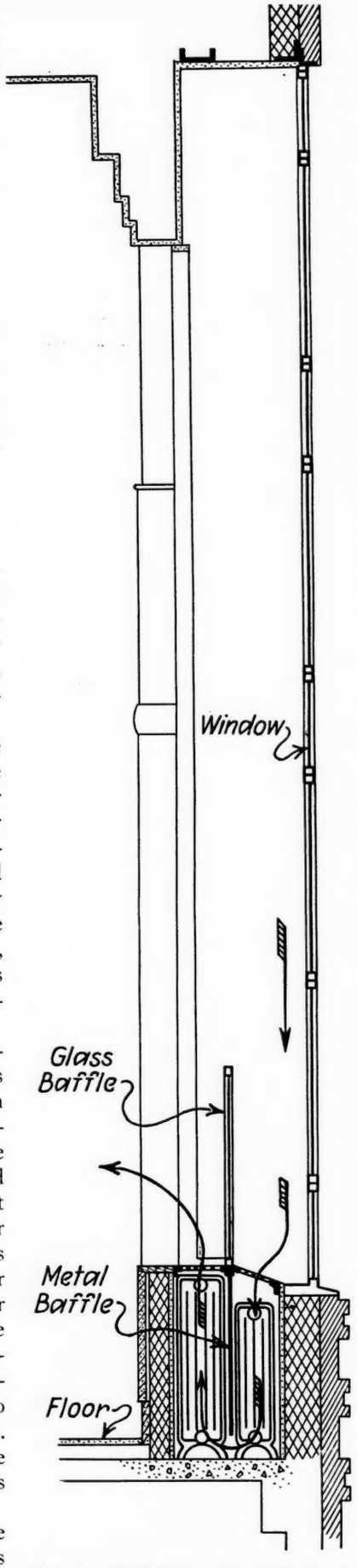


Fig. 3. Radiator arrangement to avoid down drafts from 21 ft. high dining room windows

what might be called six all-glass corridors. By means of supply grilles in one end of each corridor and return grilles in the opposite, warm air is constantly circulated between the outer and inner window surfaces. These grilles are connected by duct systems running across the ceiling to twin fan-and-heater units. These fans are so connected and controlled by dampers that either one may be used alone in mild weather.

Space between the ceiling and roof is heated by lightweight fin-tube radiation installed within the ceiling space. These convectors are provided with long outlet flues so as to produce a fairly high velocity natural draft over the surface and to carry the heat into the upper parts of the ceiling space.

The remainder of the main concourse is surrounded by the ticket office, concessions, corridors, offices, etc., which are heated in the usual way.

Thermostatic Control

For the main and train concourses the thermostatic control system is not entirely automatic and requires some manual operation of switches to suit varying weather conditions. The system installed for the Cincinnati Terminal is compressed air operated.

Each of the two fan systems supplying tempered fresh air to the train concourse is provided with two duct thermostats; one two-point in the cold air side controlling the first two heater rows and one three-point in the hot air side controlling the last three heater rows. A similar arrangement is used for all supply systems in the building.

The two warm-air systems in connection with the train concourse are controlled by manual switches by which the main steam valves to the various rows of heaters may be opened or closed; one switch is provided for each of the four heater rows. It is anticipated that these heaters will be turned on or off as the room conditions change and as indicated by thermometers connected to the return air ducts. However, a pilot thermostat has been provided in each return duct so that in the event the temperature in the return ducts—and consequently in the concourse—falls below a predetermined point, all heaters will be thrown on until the temperature again rises to that set on the thermostat.

Vestibule systems for the three

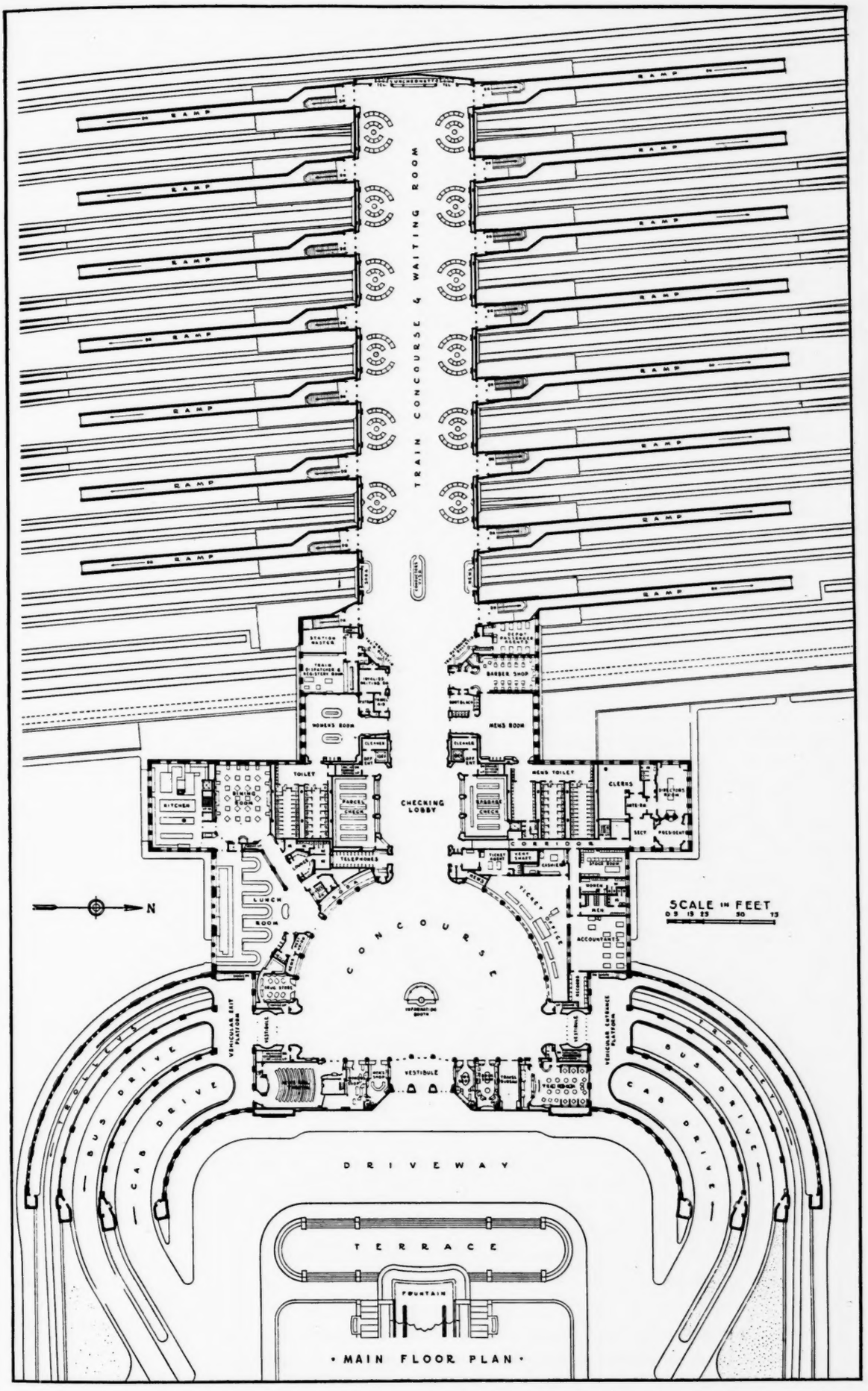


Fig. 4. Main floor plan. The tracks and platforms are below the train concourse

Fig. 5. Mens' shop. Note the novel method of combining the air supply grilles with the side lighting fixtures.

vestibules entering the main concourse are similarly controlled by switches located in a closet space on the main floor level. The roof space heaters are controlled by thermostats located within the roof space; these are special high range as it is likely this space will be maintained at temperatures at least 20° in excess of the desired temperature of the floor below.

Heaters on the outlets of the fans circulating warm air through the space enclosed by the double windows are controlled by two-point duct thermostats controlling groups of heater rows.

The master control of the main concourse is a pilot thermostat located on the column of the Information Bureau which is approximately in the center of the floor space. If the concourse should fall below the set temperature on this thermostat, the roof heaters, double window heaters, and vestibule heaters would all be turned on full until such time as the condition was corrected.

Newsreel Theater

One of the unusual features of the Terminal is a small moving picture theater in which one may see newsreel and film shorts while waiting for train time. This theater is provided with a complete air conditioning system arranged for summer cooling. The conditioning is accomplished by a spray dehumidifier containing brine cooling coils. The brine is obtained from the refrigerating plant which also serves the kitchen boxes, chills the drinking water, etc.

General

Steam used by the Station is obtained at high pressure from a central power house located over a mile away. It provides steam not only for use in the passenger station but for the express, mail handling, car cleaners, and other buildings situated within the Terminal area, and for direct steaming locomotive use, and the coach-heating system in the Station yard and coach storage yards.

At the Passenger Station the steam is reduced to 5 lb. pressure for heating and 35 lb. for kitchen and hot water supply, the latter systems being in use the year around. The Station heating system is two-pipe with vacuum return.

Baggage rooms are heated by suspended unit heaters, but cast-iron radiators are generally used throughout the remainder of the building. The heaters for air tempering and warm-air heating are also of cast iron.

Steam piping is standard weight steel and returns are extra strong wrought iron.

There are some 25 centrifugal fans on the job for use in the heating, air supply, and exhaust systems. These range in size up to 51,000 c.f.m. and are all of the backward-curved-blade, high-speed type, with multi-belt drives on short centers. Motors were specially designed for quiet operation on alternating current and are generally of the slip-ring, varying speed type.

Each air supply unit utilizing fresh air is equipped with an air filter employing a porous cellulose disposable filtering medium.

Louvered dampers are set in the intake of each supply fan and in the discharges of the exhaust fans. These are operated by the thermostatic-control air system and are so connected to the motor controllers that they automatically open when the fans start and close with their stopping.

The Station is owned by the Cincinnati Union Terminal Company, and was erected under the direction of Col. H. M. Waite, chief engineer. Alfred Fellheimer and Steward Wagner were the architects, and James Stewart and Company, Inc., the general contractor. The sub-contractor for the heating and ventilating work was the A. R. Brueggeman Company, Cleveland.

Air Conditioning the Broadcast Plant

One of the N.B.C. studios in Chicago. Note top supply outlets are shown in the ceiling, the exhaust being in the pylons below

By V. J. GILCHER†

CONSTRUCTION of radio broadcasting studios compelled close study of the whole subject of sound transmission and insulation. Among other noises, those due to the air brought into and out of the studios had to be eliminated. In doing this, methods of sound insulation for ducts were developed to such a point that the solution of the noise problem in air ducts is at hand. While these methods have been developed for studio plants it is felt that they should be brought to the attention of all air conditioning and ventilation engineers since they may be applied to any air ducts where air noise is to be eliminated.

A brief description of the construction methods used in building studio spaces and a discussion of the importance of sound insulation in them is necessary in order to get a true picture of the relation of duct noises to the whole problem, and an appreciation of how carefully the insulation must be done. Consequently, these matters are discussed before passing to a description of the methods of duct insulation.

The dominant factor in radio broadcasting is sound. It must be transmitted with original fidelity—it must be controlled. Sound originating in the studio must be controlled so as not to be transmitted to other rooms. Extraneous sounds must be controlled and excluded from the studio. Sound is the sensation produced in the ear by wave motion, while noise is undesired sound. Sound not properly controlled is quite likely to become

†Plant Engineer, National Broadcasting Company, Inc., New York.

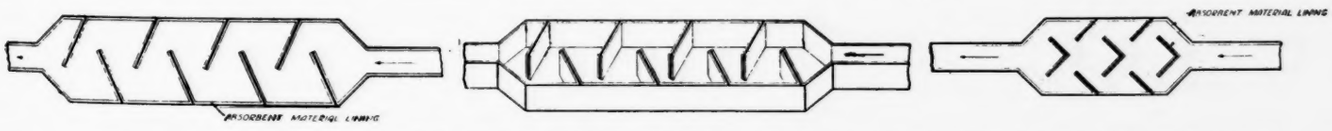


Fig. 1. (A, B and C) A and B show one method of baffling. C shows practically the same type of baffle except that it has lower resistance

noise. The success of broadcasting depends in a large measure on the proper control of sound and the absence of noise. Studios must be quiet. Not merely quiet as gauged by the average person's hearing, but to all intents and purposes practically devoid of noise.

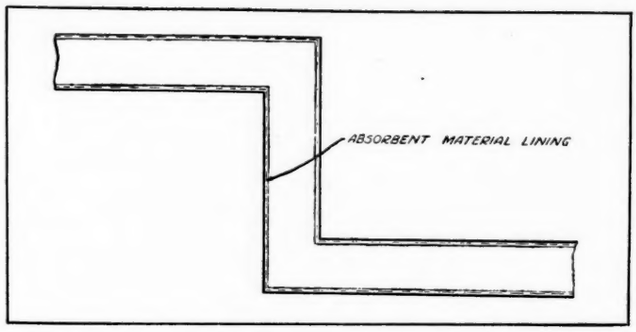


Fig. 2. A simple method of absorbing sound is to use sound absorbent lining at right-angle bends

Such rigid requirements call for elaborate methods of sound control and indicate that extreme precaution must be taken to guard against building shock and vibration entering the studio, noise leakage from adjoining studios, and transmission of noise and vibration caused by rotating and reciprocating machinery. Great pains must be taken to insulate individual studio units against transmission of sound from adjacent studios. It is not only important that sound originating in the studio be kept within bounds, but also that sounds originating outside the studio be prevented from entering.

Wherever possible, studios are constructed without windows or openings to the exterior. In addition, effective and complete soundproofing necessitates that the studio as a whole be suspended from the main building structure by means of combination spring and felt "isolators" and that the floor, walls, and ceiling, doors and glass observation windows be to all intents and purposes hermetically sealed. This construction is similar to a box built within a box; the inner box or shell being supported or attached, but not rigidly connected, to the outer box. Extreme precaution is taken during construction to see that the inner shell or studio does not come in direct contact at any point with the rigid building structure or with other "floating" partitions.

Where it is necessary to provide openings in studio partitions, special consideration has to be given to making them incapable of sound transmission. Glass observation windows are constructed of three panes set in specially constructed bucks, each pane isolated from the others, and the whole assembly isolated from the rigid building structure. Entrance doors are hung on isolated bucks and use is made of special hardware which permits the door to effect a tight seal when closed.

Broadcast studios must be to all intents and purposes hermetically sealed. Air ducts are the one exception, the one orifice in the otherwise hermetical seal, the one passageway for the transmission of sound to and from the studio. Unless proper precautions are taken, the air conditioning system will be a source of objectionable noise. The problem, therefore, is to construct these ducts so that they provide no better medium of noise transmission and leakage than is offered by the hermetically sealed and "floating" walls.

With this statement of the ends to be sought, we can now discuss some of the methods used.

Fig. 2 is a simple and apparently fairly effective method of reducing sound transmission in ducts, the theory being that sound waves of high intensity striking the flat surfaces of the right-angle bends will be reflected back to some extent. This arrangement provides added length exposing more absorbent material to the sound waves which continue through and in

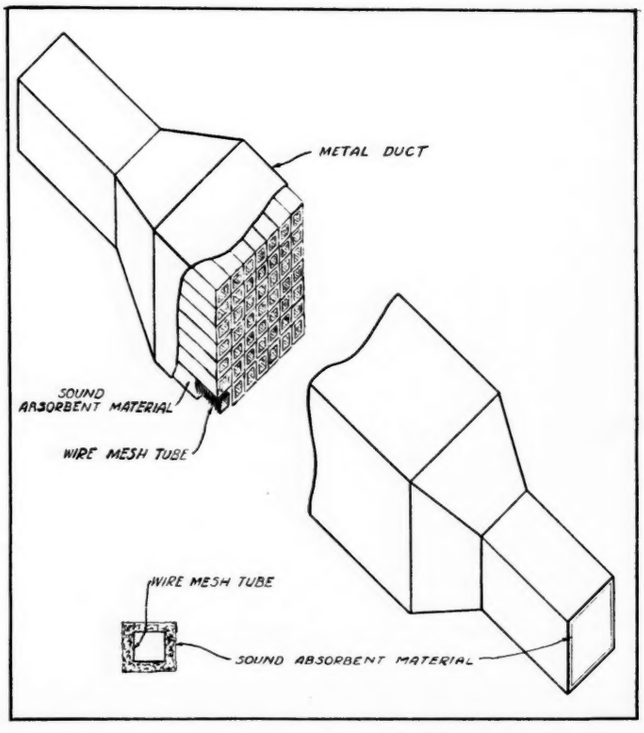
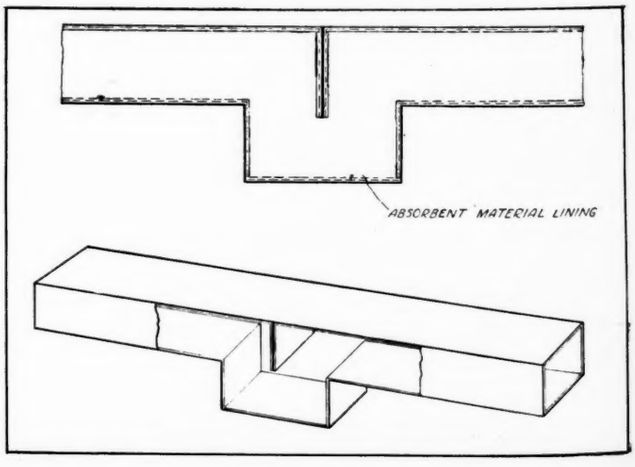


Fig. 3. (Left) A very effective and efficient absorption chamber

Fig. 4. (Below) A method similar to Fig. 2, and probably simpler



addition the bends insure that sound waves traveling in the duct come in contact with the absorbent-covered surfaces.

Fig. 4 is a simpler method of effecting practically the same principle as Fig. 2. Care should be taken in the selection of material for baffle plates so that they are of sufficient rigidity and mass as not to set up vibration and wave motion of their own when reflecting sound waves. This is perhaps the simplest of the sound absorption chamber type of insulation.

Fig. 1A is a very effective member of the absorption chamber family. Several baffles of absorbent board are mounted so that their ends overlap providing very high impedance to sound. The baffles are slanted in the direction of the air flow to reduce air resistance. Fig. 1C is practically the same thing except that perhaps the air flow resistance is lower for a given percentage of absorption.

Fig. 3 is probably the most effective and efficient absorption chamber yet developed. It offers the maximum sound absorption with a minimum of air resistance. Unlike the previously described units, this device uses no baffle plates or bends to accomplish sound absorption. It depends entirely on the principle of large surface areas of absorbent material exposed to sound passing through it. It is cellular in construction, being made up of a number of wire mesh tubes wrapped with material of a high absorption coefficient. The result is many small diameter ducts or tubes having considerable thickness of absorbent material exposed in each. Sound entering the chamber is reasonably distributed through all the small diameter tubes, and a greater portion of the sound wave comes in contact with the absorbent material.

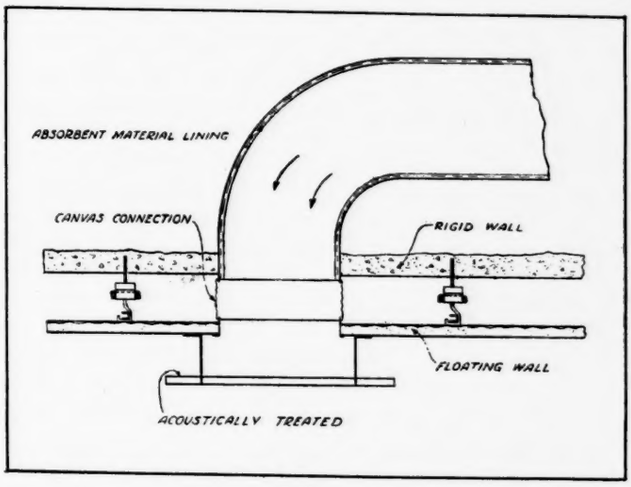


Fig. 5. A method of isolating the duct from flow absorption using a canvas connection

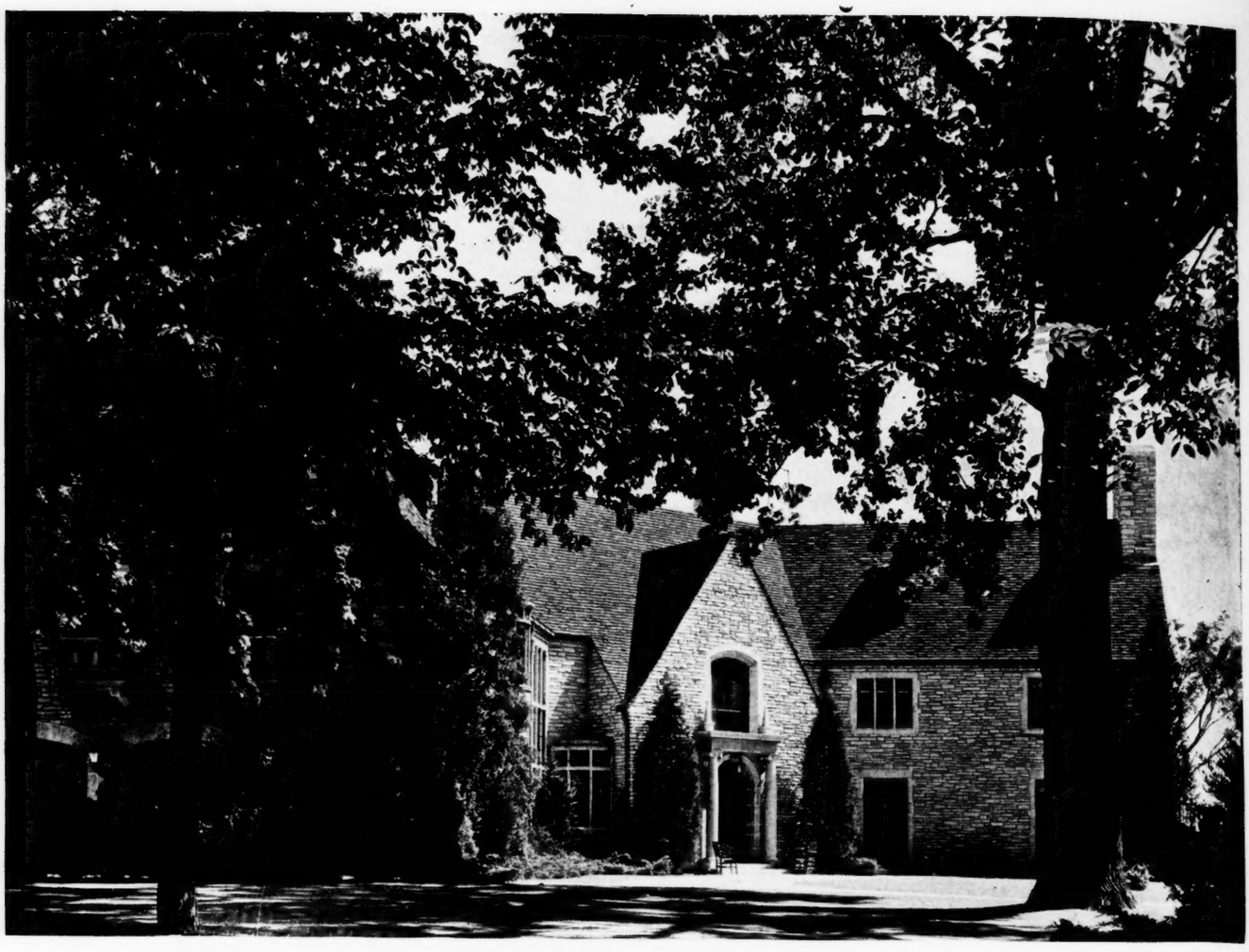
The four previously described devices deal particularly with the transmission of sound waves probably originating in some studio or other, or set up by ventilating machinery. At any rate they are designed to handle sound waves traveling in the air column inside the duct.

Fig. 5 shows a method used to isolate the duct from the floating partition. This isolation is to prevent that energy which is traveling in the form of mechanical vibration in the duct metal itself from coming in contact with the grille member attached to the floating partition. This isolation is effectively accomplished by a canvas connector as shown. The metal ducts transmit vibration and sound of every description and source, and in fact this metal is an even better sound transmission medium than the air space inside the duct.

Improved Ventilators for British Railroads

VENTILATION of railroad cars to be efficient must be proof against drafts and incoming smoke and rain. This condemns as useless the usual apparatus fitted across the top of the door optimistically referred to as a ventilator. There are appliances proof against the entrance of undesirable elements; they function as ventilators by extracting the air from the inside of the car, provided that there is a current of air passing across them in any direction whatsoever. In other words, they depend upon the ejecting action of a passing current of air, whether it be due to the wind or to the passage of the vehicle through the air, and this action is independent of the direction of the ejecting air current. The universal fitting of these appliances and the removal of the anachronisms over the doors would, it is contended, deal satisfactorily with the dirt and drafts question and would add greatly to the amenities of railroad travel. These things are now being done on long express services and are being considered for shorter journeys, too. Better ventilation is now recognized as a means of combating road competition.

The new system, which is being tested on the London, Midland & Scottish Railroad's sleeping cars, constitutes a distinct departure from an improvement on all previous methods of railroad ventilation employed in Europe. Fresh air is "scooped" into the corridor of the vehicle by air scoops in the side of the car, arranged to operate according to the direction of the train, the air being cleaned by passing over oil filters. The scoops can induce 400 c.f.m. of fresh air into a 28-passenger sleeping car travelling at 55 miles per hour, the stale air being extracted through the roof. The difference in pressure in the compartments and corridor causes the fresh air to flow through louver vents in the bottom of the compartment sliding doors, these vents being under the control of the passengers.—*A. C. Blackall.*



Residence of C. P. Dubbs, Wilmette, Ill.

Complete Automatic Temperature Control in a Modern Residence

By R. P. DEWEY†

THE new residence of C. P. Dubbs, in Wilmette, Ill., is remarkable in many ways, one of its most outstanding features being the temperature control system. Mr. Dubbs who with his father developed the cracking process for petroleum distillation, is a busy and capable chemical engineer and has had ideas for this house in mind for some time. Now he has built it on a beautiful plot of ground along Michigan Avenue, Wilmette, overlooking Lake Michigan.

As shown in the floor plan, the house has a broad V-shape, is of special construction on a steel and reinforced concrete framework, and consists of two floors with a full basement and attic. Every provision has been made for comfort and proper service facilities. The interior decoration is tasteful and consistent throughout the house. Everywhere the best of materials and methods have been made use of in order to achieve a home that would be livable, useful, adaptable, and enduring.

A vacuum steam heating system, fired by a fuel oil burner, serves the entire house and the built-in garage. In addition there is a special unit which introduces properly humidified air at two points on the first floor.

The temperature and humidity controls are electrically operated. A full automatic control system is installed which not only gives individual control in every room and hall in the house, but incorporates two-temperature thermostats throughout, arranged so that the change from the normal day temperature to the lower night temperature and vice versa takes place automatically at predetermined times. In this way the tem-

†Chief Engineer, Barber-Colman Company.

perature of each room may be set as desired and is maintained constantly, regardless of the temperature at which the other rooms may be kept. During the night the rooms are held at lower temperatures to provide increased economy of operation of the heating system, and the controls are such that this lower night temperature may also be set individually for each room. There are also automatic controls on the humidifier to insure that the air throughout the house is kept constantly at the desired relative humidity.

Heating System Controls

The principal feature of the heating system controls is the fact that the temperature of each room is maintained separately from that of other or adjoining rooms. This differs materially from the common temperature control system in which the temperature of all the rooms in the house is under the control of a single thermostat in a downstairs room. In the Dubbs residence there is a thermostat in every room. This thermostat is electrically connected to the electric-motor-operated valves on the radiator (or radiators) serving that room. As the thermostat calls for more heat or less heat to keep the temperature in the room uniform, the valves are opened or closed to admit steam or shut it off as required. There are adjusting levers on the thermostats so that the day or night temperature may be set at whatever point is desired between the limits of 60° to 80° for day and 50° to 70° for night. The customary day setting is, of course, in the neighborhood of 70° for most of the rooms. However, where higher temperatures are desired as might be the case in bathrooms, sick rooms, playrooms, etc., they can be obtained simply by setting up the thermostat. This arrangement is known as two-temperature individual room control.

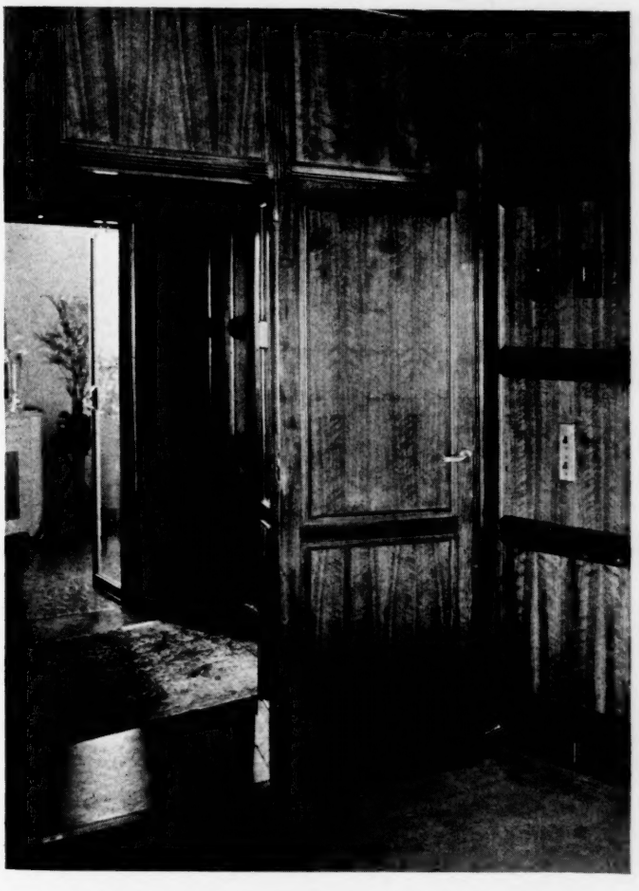
Automatic Burner Control

This separate control of temperature in the individual rooms is made possible largely by the method in which the operation of the oil burner is controlled from the thermostats in the various rooms, accomplished through auxiliary switches in the motor-operated valves and a relay which is connected to the burner controls. The arrangement of this circuit is such that the burner operates and supplies steam to the system whenever a thermostat in any room or rooms in the house calls for heat and has consequently caused the valves on the radiators in that room to open. Steam is supplied as long as any valve or valves are open, and is shut off only when all the valves in the house are closed, a condition which takes place when all the rooms are warm enough as indicated at the thermostats. This means that the burner may be running, due for example to rooms on the second floor calling for heat, but no heat will be supplied through the radiators on the first floor if the temperature there has already reached the proper point and the thermostat has caused the valves to close. Or, if a strong breeze is striking one side of the house in cold weather, the valves in the rooms on that side will remain open longer than those in the rooms on the protected side, and consequently heat will continue to be supplied to the colder rooms after the others have had enough. When all the rooms have become heated as required by the settings of the thermostats, the burner shuts off and will stay off until some valve or valves open and heat is again required.

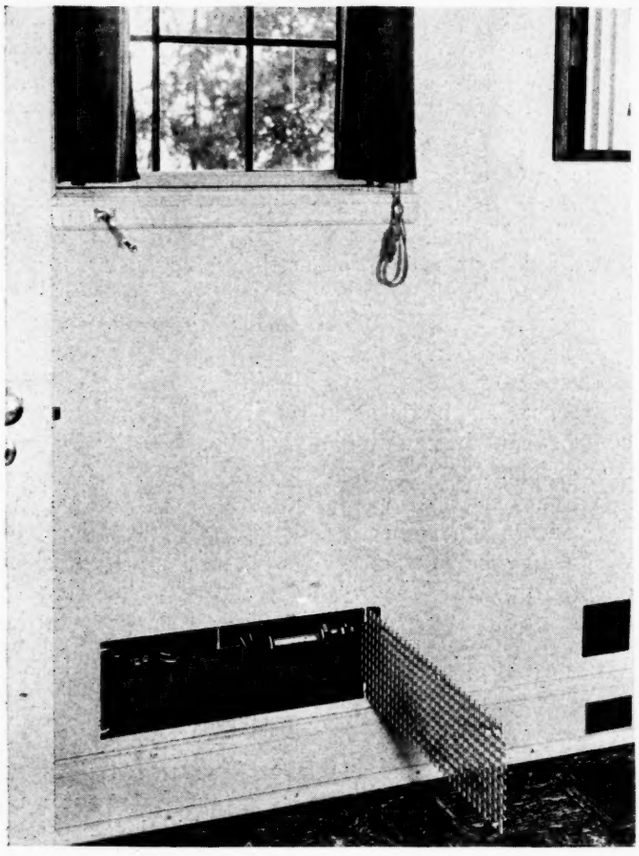
The switches through which this relay control is accomplished are actuated by cams on the shaft of the valve motor-operator. When the valve opens, a contact is made and a circuit completed to close the relay which controls the oil burner. All of these circuits from the various rooms are in parallel so that any room can close the relay, but it takes all of them together to open it and shut off the burner. In this way individual room control can be successfully and automatically accomplished.

These auxiliary switches are also used for passing the control signal one to another of the several valves which may be in one room and under the control of one thermostat. The wiring is such that the first of the series of valves receives its impulse direct from the thermostat, and the second gets its signal from the switches on the first motor-operator. The switch in the last valve of the series is the one which is connected to the relay.

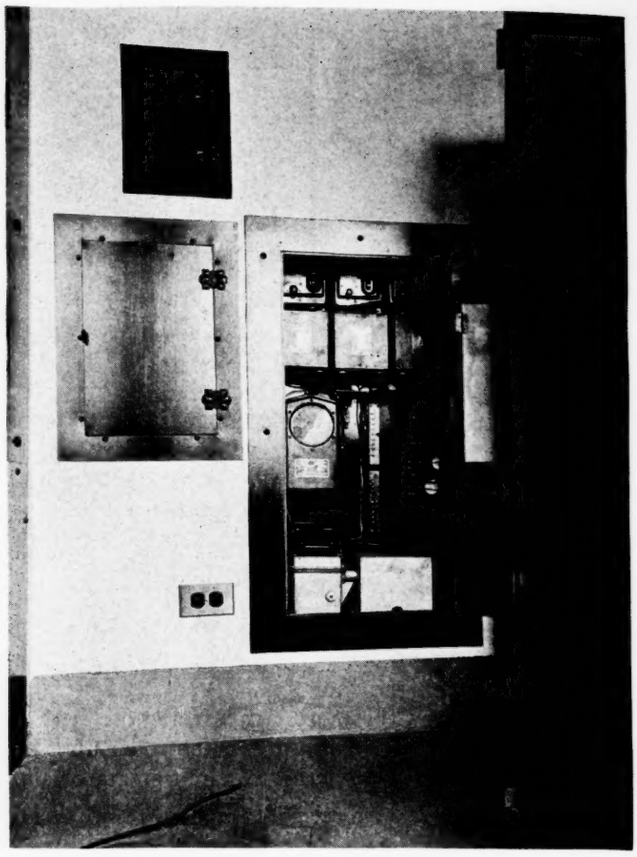
In some other circumstances these switches act as relays to control the functioning of auxiliary apparatus which is to operate in conjunction with the operation of the valves. For instance, on the humidifying unit,



A two-temperature thermostat shown at the right and a hygrostat at the left are located in the library which is an approximately central location in the living quarters on the first floor



A cylindrical device on the right of the lower grille of the concealed radiator is the motor-operated steam inlet valve. Power and control wires for the valve lead from the wall plate at the back of the opening



A control panel is located in a small room in the basement. Circuit breakers and transformers are in the top of the box. Night-daytime switch at left with motor-driven program switch for making changeover of thermostats at bottom of box

which will be described later, the fan motor is started by the motor operator of the valve on the water supply for the spray heads by means of the switches and a relay. In other installations of electrically-operated temperature control equipment, these switches are used for many various similar purposes.

Two-Temperature Thermostats

Another principal feature of the Dubbs installation is the two-temperature or dual range control which extends throughout the entire house. The principal purpose of this, of course, is to make possible the maintenance of a lower temperature throughout the night, with resulting economy in heating costs.

The thermostats used contain two bimetal elements, one of which is set for the temperature to be held during the day time part of the cycle and the other for the lower night time temperature. At the top of the case is a switching device by which the circuit leading from the thermostat to the first valve in the room is transferred from one to the other of the two control units. This switch may be operated either by hand, or electrically from a remote point, the latter type of operation being accomplished by small a.c. electromagnets which are energized to throw the switch one way or another as desired. With one of these thermostats in each room it can be seen that the two-temperature control is very flexible. For instance, if one room is to be used late at night when the rest of the house is on the night range, the thermostat in that room can be set on the day range manually and will then hold that room at the higher temperature without affecting the other rooms in the house. The same condition holds for several rooms as well. Also, the particular night temperature for each room can be chosen individually and set as desired to meet any special conditions that may exist. For instance, one person may prefer to have the bedroom quite cool at night during the winter while another may wish it kept fairly warm; providing that the windows are not opened so much as to overcome the heating system, this can be readily accomplished by proper setting of the two-temperature thermostats in the respective rooms.

Program Switch

Two-temperature thermostats throughout the house are shifted automatically from the day to the night ranges by means of an automatic program switch. The program switch is operated, in turn, by a time switch which is set to change circuits at chosen times automatically. The time switch contains a telechron mechanism so that it does not require attention. As at present arranged in the Dubbs residence, the signal to change from the day to the night range is given at 10:30 p.m. and the shift back to the day range comes at 6:30 a.m., all the thermostats in the house being affected at these times. In addition, there is another day-to-night signal sent out at 1:30 a.m. for the pur-

pose of resetting any thermostats that may have been manually set on the higher range for the late evening. This might be done, for instance, if entertaining were going on in part of the house, or if someone were working or studying late at night and wished the higher temperature maintained in the room being used. The time switch which controls these programs may be changed readily so that a different set of changes and resets may be obtained for different seasons of the year or to suit different occupancy conditions.

Humidifier Controls

In order to produce and automatically maintain the proper relative humidity in the house, a special arrangement of automatic controls is found on the humidifier. This humidifier is of the forced-air steam-coil-and-spray type which sends warm moist air into the house through two large centrally located outlets. The unit contains a motor-driven fan, steam coils for warming the air, and warm water sprays for supplying the moisture. Short ducts lead from the unit to the outlets on the first floor.

The principal control is a hygrostat on the wall of the room in which one of the outlets is located. Another hygrostat in the duct acts as a pilot, and the two hygrostats work together to control the operation of the unit.

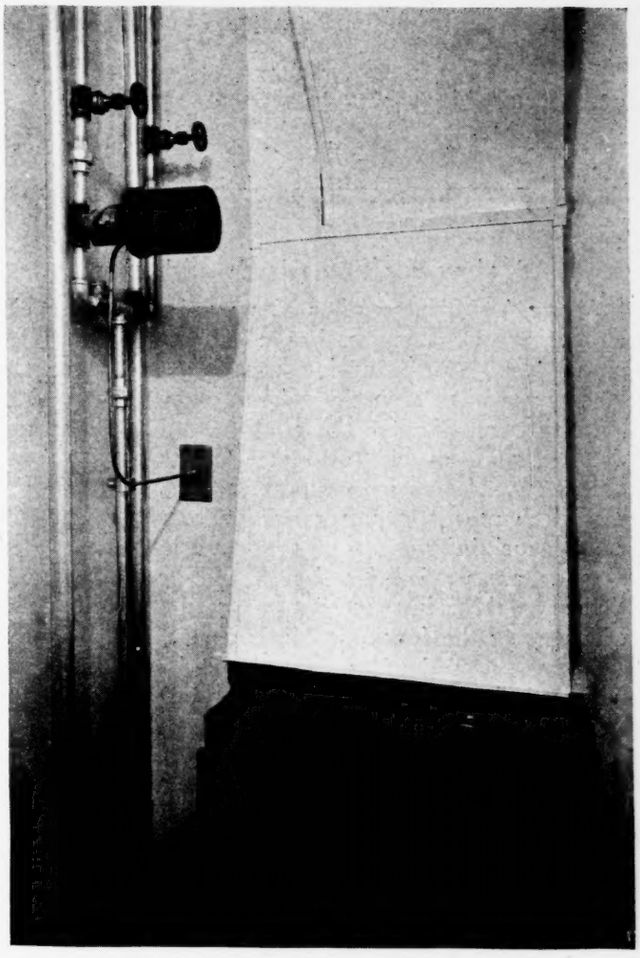
When the room hygrostat calls for more humidity, it signals for opening of the motor-operated valve on the water supply to the spray heads. These operate in a spray chamber which has heating coils in it through which the moisture-laden air is forced by a fan. A surface thermostat on the return line from the heating coils is actuated when the return line warms up, this thermostat allowing operation of the motor-operated valve on the water supply line only when the steam coil is warm. At the same time, by means of a relay, the fan motor is started and the whole humidifying unit is then in operation. Should the relative humidity of the air being sent through the duct rise beyond a certain point, the duct hygrostat will shut off the water sprays for a short time and open them again when the air becomes drier, thus keeping the moisture from becoming excessive in the ducts.

When the room hygrostat signifies that the relative humidity has reached the desired point, the sprays are shut off by the hygrostat and the fan stopped by the relay. In this way complete automatic humidity control is obtained.

Unit Heater Controls

There is one place in this residence where an indirect heater is used which resembles in function a unit heater and which consequently requires a slightly different method of control. In the dining room most of the heat is supplied by this unit heater which is mounted in the basement and connected to the room above by means of a short duct. Behind the steam coil of the unit a motor driven fan is mounted to force air past the coil and into the room at low velocity.

The controls on this unit consist of a motor-operated valve on the steam supply to the coil and a relay to operate the fan motor on signal from the valve motor-operator. Here again the auxiliary switches in the valve motor-operator are used to actuate the relay. When the room thermostat calls for heat, the valve opens and admits steam to the heating surface, then the auxiliary switch closes the relay and the fan motor starts. The auxiliary switch is, however, in series with a surface thermostat on the return line from the coil so that the fan will not start until the coil is warm. Shutting off in the same sequence as above takes place when the thermostat signals that no more heat is required. This gives a very good control on this type of device for supplying forced warm air to one particular area and has the principal advantage of preventing cold blasts because the fan does not run except when there is steam in the radiator.



A hygrostat controls this valve in the hot water supply line for the humidifier sprays

The installation in the Dubbs residence represents about as complete and thorough an installation of automatic temperature controls as is possible at the present time on a heating system of this type. The principal point in connection with it is the fact that the arrangement is extremely flexible, provision being made so that almost any condition of weather or occupancy can be taken care of accurately and without difficulty. There are many residences which could make good use of a partial adaptation of the control system here described.

Abstracts . . .

Reviews and Summaries of. . . . Current Papers, Books and Pamphlets

A New Book on Air Conditioning

James A. Moyer, author of a number of textbooks on engineering subjects, has collaborated with Raymond U. Fittz in producing what is on the whole the best text available on the subject of air conditioning.

In the first chapter the authors discuss air conditioning principles and cover the fundamentals of psychrometry. Ventilation requirements are treated in the second chapter in a comprehensive way, this part including such information on comfort charts and related data as are needed for design and operating work. Following these introductory chapters are eight parts which cover the functions of air conditioning and the equipment needed to produce the desired results, the subjects including cleaning, cooling, properties of refrigerants, controls, and fans.

Buildings which require or operate under conditions which differ from one another, such as offices, theaters, restaurants, food and textile plants, railway cars and residences, are each treated in 7 separate chapters. The appendix include tables on properties of air and water mixtures, and on properties of ammonia.

Two features of the book which recommend it are the inclusion of problems in each chapter with the solution, so that the user can check on his ability to apply the explanation and reference data, and the profusion of tabular and graphical material, including that on costs, which up to the present have been available only in many scattered publications. The book differs from many engineering texts in that the material is not out of date by the time it is off the press, as the authors have adequately covered such comparatively recent phases of conditioning as steam jet refrigeration, silica gel refrigeration units, and use of calcium chloride. Designers, and to some extent installers and users of air conditioning systems, should find this volume one of their most frequently-used reference books.

[*"Air Conditioning," by Moyer and Fittz. Published by McGraw-Hill Book Co., Inc., 330 West 42nd St., New York. Green-cloth bound; 375 pages; 202 illustrations, mostly drawings and graphs; about 42 tables, with three fold-in charts perforated for easy removal; 6¼ in. × 9¼ in. Price, $4.*]

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Industrial Research Laboratories

Recently off the press, Bulletin 91 of The National Research Council, is the fifth edition of the Council's listing of industrial research laboratories, including consulting laboratories engaged in industrial research. Information, classified under the company name, covers the name of the director, number of assistants and other workers engaged in research, together with an outline of the work being investigated. The appendix includes a listing classified geographically, and another classified according to the type of work being carried.

According to the introduction, 643 industrial plants have made no change in the number of research personnel during the past three years, 113 laboratories have been discontinued, 187 have increased personnel, and 512 decreased the number of employes in research work.

[*"Industrial Research Laboratories of the United States," Bulletin 91, Fifth Edition, The National Research Council, Washington, D. C.; 6½ in. × 9¾ in.; 223 pages; paper bound; price $2.*]

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Heat from Electric Lights is Important in Heating and Cooling Problems

Most engineers pay little attention to the heat given off by electric lights into the rooms of buildings. In only unusual cases has it been considered of importance. One of these cases is where artificial cooling is used, for then the lighting heat may be a considerable part of the load imposed on the cooling plant. This load tends to increase both the first cost and operating cost of the cooling system. With the increased interest in these installations the question of the effect of the lighting heat is timely.

Authors of this paper discuss the distribution and dispersion of this heat and decide that from 50% to 90% of it, the actual amount depending on the particular installation, becomes a part of the cooling load. They also show that about 35% to 40% of the energy of the lamp is theoretically removable by some form of ventilation.

Analysis of the relative importance of the factors which go to make up the cooling load on certain typical buildings leads them to conclude that the electric lighting heat is responsible for from 5% to 50% of the total load. It is usually of greatest weight where there is no appreciable sun load.

With these facts in mind they describe some methods of diverting the heat at the source so that it cannot become a part of the heat load of the equipment. Among these are the circulation of air through a false ceiling, and through enclosures built to contain the lights. Their tests showed that it is not possible to remove by air circulation more than about one-third of the total heat generated by the lamps, and it may be noted that this finding checks up well with the 35% to 40% predicted by analysis.

After referring to an installation in Philadelphia where a ventilated lighting system was used to advantage, and after a cost analysis of a 15-story office building in Detroit, they reach the following general conclusions.

"For lighting systems employing the usual types of luminaires placed below the ceiling, it is mechanically possible to install a ventilating system with air ducts to the units so that a maximum of about one-third the total generated energy can be removed. With the so-called 'built-in' types of lighting equipment where a free circulation of air is provided around the lamp, the amount of heat carried off will depend upon the heat transmission characteristic of the glass through which the light enters the room. If this glass is of the heat-resisting heat-absorbing type and is itself cooled, then at least twice as much can be removed by the ventilating air as found possible from the usual types of lighting units suspended below the ceiling.

"Buildings Artificially Cooled. In artificially-cooled buildings it is estimated that from 50% to 90% of the total energy generated by the lighting system will eventually become a burden on the cooling load unless this energy or a part of it can be carried off direct from its source. Inasmuch, however, as a maximum of only one-third the total energy can be removed from the usual types of lighting equipment, it is the opinion of the authors that the cost of an auxiliary ventilating system for this purpose would not in general be economically justified for the present standards of lighting whose requirements seldom exceed five watts per square foot of floor area. In other words, for these general interiors it would be less costly to provide sufficient cooling capacity to offset the heat generated by the lamps as well as that from other sources.

"On the other hand, for interiors where high levels of illumination are used which require 10, 15, or more watts per square foot of electrical capacity, careful consideration should be given to a separate ventilating system which not only carries off the readily removable one-third of the heat energy, but also makes use of heat-resisting glass to intercept a considerable portion of the radiant energy.

"Buildings Not Artificially Cooled. In general, most buildings in existence are not artificially cooled to create comfort during the summer months. Curves indicate that the temperature due to the artificial lighting system in a closed room is of the order of ¾° for each watt per square foot of electrical energy used. This rise in temperature is not serious for present general standards of illumination, but is of considerable concern when high levels of illumination are used requiring 15 to 20 watts per square foot. In the latter case the temperature rise may be of the order of 10° to 15°. With the exception, however, of hospital operating rooms, most interiors have natural ventilation obtained from outside windows and doors, in which case the temperature rise on a summer day due to the lighting system is more of the order of 1/5° for each watt per square foot of electrical energy consumed. This again indicates that it would only be for the higher wattage capacities that any noticeable temperature rise is obtained.

"In both the closed room and the one with the windows open there is always for the 15, 20 or higher wattage per square foot installations a large amount of radiant energy from the lighting units. Although this radiant energy does not ordinarily register its presence on the thermometer, yet it creates a feeling of warmth when absorbed by the human body. It is the opinion of the authors that for all interiors where the occupants are working under high-wattage capacities for lighting, more consideration must be given to dispensing with the radiant energy. This may involve the use of heat-resisting heat-absorbing glass or the use of lamps with water cells.

"In all the foregoing discussion the problem of removing heat generated by the lighting system is of importance for only three to four months each year. During the other eight to nine months this heat may be of considerable value in contribution to the heating system for the building. It is suggested by the authors that more thought be given by heating and ventilating engineers to this phase of the problem."

[*"The Heating Effect of Artificial Lighting," by Walter Sturrock and J. H. Walker. A paper presented before the Illuminating Engineering Society, August,* 1933; *approximately* 7000 *words; illustrated with* 11 *figures.*]

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Tentative Code for Testing Air Filters

Public health officials, manufacturers of filters, and engineers have cooperated in drawing up a standard code for testing and rating air cleaning devices used in general ventilation work. The tentative code is independent of such codes as may be drawn up for the testing and rating of cyclones, dust separators, and the like for supplying air for dust hazardous occupations. In addition, ratings established under the code are not to be confused with operating efficiencies. The new code also recommends the use of the weight method and non-proprietary instruments for determining cleaning efficiencies.

The code was drawn up by the Committee on Atmospheric Dust and Air Cleaning Devices of the A.S.H.V.E. At some future date it will be submitted to the membership of that organization for approval.

[*"A.S.H.V.E. Standard Code for Testing and Rating Air Cleaning Devices Used in General Ventilation Works"; 3¾ pages; 5 drawings.*]

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Testing and Rating Code for Water-Type Concealed Radiators

In April, 1932, the membership of the A.S.H.V.E. approved a code for testing and rating concealed-type gravity steam radiators. A tentative code for concealed hot water radiators has been prepared, and during the next few months will be submitted to the membership for approval.

The hot water code provides for two methods for supplying hot water to the hot radiator, one designated as the steam method, the other the electrical method. Testing apparatus, test procedure, and methods of computation are prescribed.

[*"A.S.H.V.E. Standard Code for Testing and Rating Concealed-Gravity-Type Radiation;" 2½ pages; 3 illustrations.*]

EDITORIALS

Building and Public Works

AT latest information the Public Works Fund of $3,300,000,000 had been half assigned. Under the pressure of public criticism the Administration is urging on state, municipal, and other public officials the necessity of studying the provisions of the law to determine how they can act to help get eligible projects moving.

Analysis of the sums allotted up to September 1 shows that surprisingly small amounts have gone to non-Federal projects as yet. The total was only slightly over $54,000,000. Of this total $9,620,000 was for low-cost housing projects. This, together with a total of $20,777,198 set aside for public buildings under the supervising architect in the Treasury Department made up the funds for new building construction—a total of $30,400,000. Building construction is also involved in some alterations and repairs authorized in Federal departments. It is estimated that the total for all building purposes from the fund does not exceed $35,000,000.

Low-cost housing projects have been advanced and it is stated that some 50 have been filed. Just how many of them will eventually go ahead under the works fund is still problematical. Most of the states have no legal machinery for permitting these projects. If existing proposals along this line receive as much as $65,000,000 from the fund it is about all that can be expected. Thus, at best, from known information the total to building construction and replacement from the fund cannot be expected to exceed $100,000,000. This is not an impressive showing for building construction.

It is believed that the Administration would like nothing better than to get more local and non-Federal projects under way and would like to assign funds to building construction if worthwhile projects were at hand.

In view of this it cannot be said that the Works Administration is to be blamed for the small share of the fund which building construction has drawn. Rather the reason lies in several facts. One is that building plans are not in such a shape as to permit filing them. Another is the prevailing thought that too much public building has already been undertaken. A third is the lack of local funds and the difficulty of obtaining them even though plenty of Federal money can be had.

Probably the worst fault is that there has been no united effort to advance the claims of building projects —especially those involving modernization. Here is a condition that individual engineers and contractors can help to ratify. Go to local public buildings whose mechanical plants you feel could be altered to advantage. It will not take great time or effort to determine if worthwhile changes can be made. Then try to interest the local authorities in moving to provide money to do this under the Works Fund. The state and regional officials have already had this kind of project called to their attention. They are likely to be favorably inclined. The Washington authorities are admittedly trying to get local officials to act. Everything is favorable, therefore, except the initial push necessary to get these projects started. At present it looks as though personal initiative on the part of interested engineers and contractors is the only motive force to start things moving. The time available is short. Why not give this idea a try? It may result in worthwhile work for you as well as for others in the industry.

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Integrating the Industry

BUILDING construction is set up along with other construction as a part of one single industry in the plan of NRA codes which is fast moving toward approval. For the first time all the construction interests are being treated as something of a unit. This in itself is an innovation. Whether it has any deeper meaning, and whether or to what extent established procedures will be changed remains to be seen. The simplicity of administration gained by this method of procedure is evident. The real test of its value lies ahead when the strain comes after the plan gets into operation. Already we hear of some jealousies, and certain codes as submitted contain strange provisions as to jurisdiction. If all the contradictions can be ironed out and jealousies abated the NRA will have accomplished something worth while even before approval. If not successful in doing this, the possible complications ahead are enormous.

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The Oil Burner Code

THE oil burner code is approved. The first of the manufacturing groups whose products go almost entirely into the heating of buildings now has a set of rules of practice under which to operate. Even now it is in effect and the rules have the force of Federal law. Its sponsor body, the American Oil Burner Association, was one of those which moved early and filed its code shortly after the passage of the act. The final code is not in its original terms to be sure, but still it is close enough so that it is substantially the material which was submitted. The group is now in a position to plan its actions and has already gone about doing so. Being the first of the codes approved we are printing it in full in this issue.

TUBULAR RADIATOR DATA

NUMBER OF TUBES	3-TUBE	4-TUBE	5-TUBE	6-TUBE	7-TUBE
LENGTH PER SECTION, IN. (*Add ½" for Inlet, ½" for Outlet bushing to total computed length of radiator*)	2½	2½	2½	2½	2½
WIDTH OF SECTION, IN. (*Width of section same as width at legs for all cases except: A-Leg width = Section width plus ⅛" F-Leg width = Section width plus ⅛" for 3 and 4 tube. Other F sizes leg and section width the same U.S.-Leg width = Section width plus 3/16"*)	A,C,RB, S,U,W — 4 5/8 T-4½ K-4 13/16 CB,RR-5 CP,N,P,R-5⅛ F-5¼ US-5⅛	A,C,RB, S,U,W — 6 5/16 T-6¼ K-6 9/16 CB,F-6 5/8 R-6¾ N-6 13/16 RR-6⅞ CP,P-7 US-6 15/16	A,C,RB,RR, S,T,U,W — 8 K-8 5/16 CB-8⅜ N-8 7/16 F-8½ US-8¾ P,R-8⅞ CP-9	A,C,RB, S,U,W — 9 11/16 N-9 CB,T-9¾ K-10 1/16 R-10¼ F-10 5/16 US-10 9/16 RR-10⅝	A,C,RB, S,T,U,W — 11 3/8 K-11 13/16 CB,N,R-12 F-12⅛ RR-12½ CP,P-12⅝ US-12 3/16
HEIGHT IN.	SQ. FT. PER SECTION, CATALOG RATING				
38	3[1]	4¼[8]	5[8]	6[18]	7½[23]
37		4¼[9]	5[9]	6[9]	
36	3½[2]	4¼[4]	5[4]	6[19]	6¾[30]
32	3[3]	3½[11]	4⅓[11]	5[20]	6¼[24]
30	3[2]	3½[4]	4⅓[4]	5[19]	5½[31]
26	2⅓[10]	2¾[10]	3½[14]	4[21]	4¾[25]
25	(a)	(a)			
23	2[5]	2½[12]	3[15]	3½[22]	4¼[32]
22	2[6,A]		3[16]		4[26]
21½					3⅔[34]
20	1¾[7]	2¼[10]	2⅔[10]	3[21]	3⅔[27]
19	(a)				
18½					3[34]
18			2½[6]		3½[33]
17					3[28]
16½					3[13]
16					3¼[6]
15½					2½[34]
14					2½[29]
13½-13					2½[17]

See other side for explanation and key to manufacturers.

[1] 3 1/3 for RR. Not available from N,R,US,CB.
[2] N,R,CB,US only.
[3] 2¾ for RR. Not available from N,R,US,CB.
[4] N,R,CB only.
[5] Not available from RR,P,CP.
[6] RR only.
[7] Not available from RR.
[8] Not available from R,N,US,CB.
[9] US only.
[10] All manufacturers listed.
[11] Not available from N,R,CB.
[12] Not available from P,RR,CP.
[13] 3½ for US. N,R,CB,US only.
[14] Not available from CB.
[15] Not available from P,RR,F,CP.
[16] P and RR only.
[17] These heights, 4 makers only. 13½", 2½ sq. ft., N,R,CB only. 13", 2¾ sq. ft., US only.
[18] Not available from P,R,US,CB.
[19] R and CB only.
[20] Not available from R,P,CB,CP.
[21] Not available from P,CP.
[22] Not available from P,RR,T,CB,CP.
[23] Available only from P (7½) and RR (7).
[24] P only.
[25] Available only from N (4¾), R (4¾), P(5), RR(5), CB(5).
[26] Available only from P(4), RR(4¼), CP(4).
[27] 3¾ for RR, 4¼ for US. Not available from P,CP.
[28] 3¼ for F. Not available from R,RR,US,N,CB,CP.
[29] 2¾ for RR; 2 2/3 for F. Not available from R,US,N,CB.
[30] 7 for CB. N,R,CB only.
[31] 6 for CB. N,R,CB only.
[32] CB only.
[33] RR (3½) and CP (3) only.
[34] W only.
[35] Obtainable from either Federal Radiator Co. or Burnham Boiler Corp.
[36] See Junior size table, reverse side this sheet.

H. & V.'s REFERENCE DATA—19

TUBULAR RADIATOR DATA

Data appearing on these two pages are correct as of July 1, 1933.

IN the table on the reverse side of this sheet the letters are abbreviations of names of manufacturers, the key to which appears below. Figures in the second and third horizontal columns indicate the length and width per section in inches, while those in the main part of the table indicate the square feet per section.

The table assumes that every manufacturer can supply all sizes of radiators and that all radiators are of the capacity given in the table. Since this is obviously not the case, the footnotes show what manufacturers cannot supply, and also what the rated capacity is if it differs from the figures given in the table. For example, the three-tube, 38-in. radiator is listed as having a capacity of 3 sq. ft. per section. Footnote 1 explains that RR rates this as 3 1/3 sq. ft. per section, and also that N, R, US, and CB cannot supply. In other words, this size is available from all manufacturers except the four named, and of the 13 remaining makers, all except RR rate it at 3 sq. ft. per section.

Where (a) is indicated in the table it means that radiators of this height and number of tubes are available in junior type, dimensional and capacity data for which are given in the table below.

In the third horizontal column, Width of Section, the width varies for various manufacturers and the proper width is given opposite the manufacturer's abbreviation.

The table can be used to select radiators, to size them on drawings or layouts, and has the advantage of containing in a small space dimensional and capacity data for the 17 makes of radiators, manufacturers of which are believed to represent at least 95% of the output in this country. Perhaps the most valuable use of this table is to locate a radiator of odd size.

MANUFACTURER	TRADE NAME	MANUFACTURER	TRADE NAME
A American Radiator Co.	Corto	P Pierce, Butler & Pierce Mfg. Co.	Eastwood
B Burnham Boiler Corp.	Burnham[25]	R Republic Radiator Co.	Oriole
C Crane Co.	Crane	RB Richardson & Boynton	Richardson
CB Columbia Radiator Co.	McKeesport	RR Richmond Radiator Co.	Richmond
CP Crouse-Pope Foundry	Empress	S H. B. Smith Co.	Smith
F Federal Radiator Co.	Ferro[25]	T The Thatcher Co.	Gothic
K Kohler of Kohler	Kohler	U Utica Radiator Co.	Utica
N National Radiator Corp.	Aero	US United States Radiator Corp.	Capitol
		W Weil-McLain Co.	Cameo

JUNIOR SIZE TUBULAR RADIATORS

	3-TUBE AMERICAN 3-TUBE BURNHAM 2-TUBE WEIL-McLAIN		4-TUBE AMERICAN 4-TUBE BURNHAM 3-TUBE WEIL-McLAIN	
	LENGTH PER SECTION ALL MODELS 1½ INCHES			
HEIGHT IN.	WIDTH, IN.	SQ. FT. PER SECTION	WIDTH IN.	SQ. FT. PER SECTION
25	AMERICAN 3½	1 5	AMERICAN 4⅜	1 8
22	WEIL-McLAIN 3½	1.3	WEIL-McLAIN 4⅜	1.6
19	BURNHAM 3	1 1	BURNHAM 4 3/11	1.4

News of the Month

A.S.R.E. and A.S.M.E. to Hold Joint Air Conditioning Forum

Arrangements are being made for a joint forum on air conditioning for members of the A.S.R.E. and the A.S.M.E. when the two societies meet for their annual meetings in New York early in December. The 29th annual meeting of the refrigerating men is scheduled for December 6-9, and the New Yorker Hotel has again been selected as headquarters. Technical sessions covering a wide variety of subjects are being arranged by A. R. Stevenson, Jr., chairman of the program committee.

The 54th annual meeting of the A.S.M.E. will be held during the week of December 4-8, with headquarters at 29 West 39th Street.

Association for Better Housing to Organize in Chicago

The National Association for Better Housing will hold its organization convention at the Union League Club, Chicago, October 31 and November 1, at which time concerted efforts will be instituted to obtain favorable concessions for the home builder under the NRA. J. Soule Waterfield, vice-president of Starrett Building Company, and chairman of the organization committee of the association, has announced that every effort will be made to keep costs within the limit of public acceptance for the home buyer, as this type of building utilizes the maximum amount of labor and an upturn in such activity will greatly relieve unemployment in the construction industry. The administration at Washington is in sympathy with the movement, according to Mr. Waterfield's belief.

Simplification and waste elimination in the construction, finance, and sale of housing will constitute a principle field of endeavor for the association. Slum clearance and garden or subsistence homesteads will be comprehensively discussed by experts in this field.

Philadelphia Has Gas Conditioned Residence

To demonstrate the use of gas in air conditioning, The Philadelphia Gas Works Company has equipped a modern 10-room residence in Queen Lane Manor, Germantown, with a complete year 'round forced-air system, using silica gel and tap water for summer cooling and dehumidification. The house, known as the "Home of Controlled Climate," is of early American colonial design, and is constructed of native stone, 18 in. thick with steel reenforcement. Solid sheets of cork insulation 1½ in. thick are placed in all outside walls and second floor ceilings, and rock wool insulation is installed around window and door frames and eaves. Single sash having double panes of glass with air space between are used throughout to further reduce heat loss and to prevent condensation.

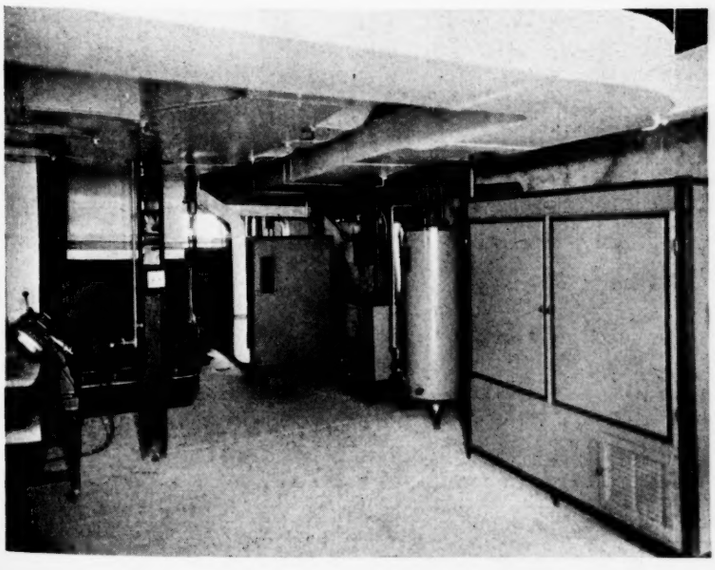
Operation of the heating and cooling unit is regulated thermostatically, and the equipment is controlled from a small bronze panel located in the basement stairway. From this central control, the occupants of the residence can dictate whether the air shall be simply circulated; cooled and circulated; or cooled, circulated, and dehumidified, according to outside conditions.

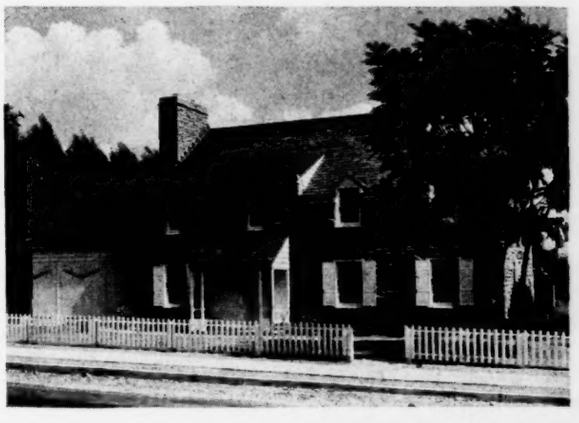
In addition to warming the house in winter, and reconditioning the moisture-absorbing silica gel beds for summer dehumidification, gas performs numerous other services in this home. A gas-operated water cooler supplies running ice water to the master's bedroom, butler's pantry, and recreation room in the basement. This fuel also provides a hot water supply, drys and irons clothes in the laundry, heats the two-car garage adjoining the residence, and operates an incinerator.

Representatives of the company are in attendance daily from 1 p.m. to 9 p.m. to explain the operation and functions of the air conditioning equipment to visitors.

Rooney Joins Noland Company

Martin A. Rooney, for many years connected with Pierce, Butler & Pierce Mfg. Company as general





Below is front view of the "Home of Controlled Climate," Germantown, Pa., in which The Philadelphia Gas Works Company is demonstrating to the public a complete year 'round air conditioning system operated by gas fuel. Photo to the left shows arrangement of compact heating and cooling system in the basement. The silica gel dehumidifying unit is seen in the center background.

sales manager, and prior to that as sales executive with the American Radiator Company, has become associated in the same capacity with Noland Company, Inc., large heating and plumbing wholesalers in the South with headquarters in Newport News, Va.

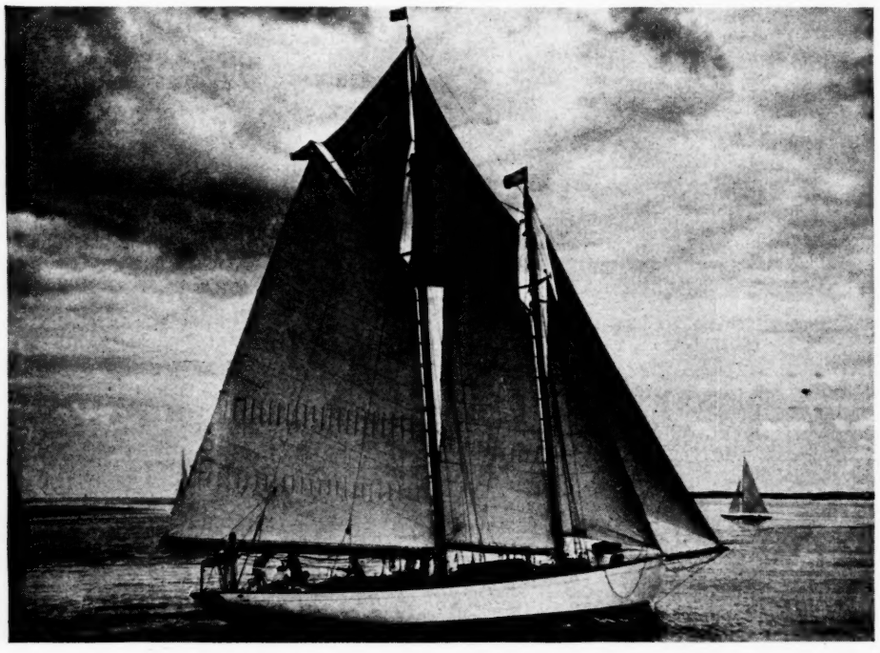
Anthracite Institute Bulletins Record Fuel Tests

Four bulletins, numbered 17 to 20, recording the findings of laboratory tests of anthracite coal in competition with other fuels for house-heating and water-heating purposes, have been published by The Anthracite Institute, Primos, Pa.

Bulletin 17, entitled "Anthracite vs. By-Product Coke," is a resume of Report No. 2020, in which the results of a comparative test of the two fuels conducted in the Institute's laboratory are recorded. The laboratory's findings are unfavorable to coke and claim that it requires more space for storage, produces less heat with a given draft, is less uniform in heat output, must be fired at shorter intervals, and cannot be banked for as long periods. The maximum efficiencies of the two fuels were found to be approximately equal, but at all rates over 70% of heater capacity, the anthracite was found to have an advantage.

In Bulletin 18, the relative cleanliness of 14 fuels as determined in the Institute's laboratory are discussed. Factors considered include: character of the solid material in the flue gas as related to its ability to permanently soil or injure fabrics; density of the material; weight emitted, and volume emitted. For purposes of comparison, results are recorded comparatively, with reference to anthracite chestnut. It was found that the density of the material resulting from combustion of anthracite is generally less than that from competitive fuels, and hence tends to fall back into the base of the chimney instead of being carried out with the hot gases and deposited upon surrounding objects.

Bulletin 19 compares anthracite with fuel oil as a house-heating fuel with respect to capital investment, operating costs, convenience, safety, comfort, and cleanliness. The laboratory finds anthracite the more economical fuel both as to equipment required and operating costs, as well as superior to oil in a number of other counts.



The 62-ft. schooner "Brilliant," owned and piloted by Walter Barnum, president of Motorstokor Corporation, leaving City Island, New York, June 14 at the start of its record-breaking passage to England, accomplished in 15 days, 23½ hr. Competing in the Fastnet races, held in Plymouth, England, the "Brilliant" took fourth place in spite of not having been especially designed for racing.

Bulletin 20 discusses the economy of heating service water with small "bucket-a-day" stoves. This report, in addition to recording cost data, contains installation suggestions, and descriptions of economical coal-burning water-heating equipment.

Air Pollution Increases as Business Rises

Air pollution, largely emanating from smoke and dusts from industrial processes, is an index of industrial activity, according to David R. Morris, meteorologist at the weather bureau, Central Park, New York, who attributes the greater density of dusts suspended in the air over the metropolitan area to improved business conditions. Average pollution during July was 1.59 tons per cubic mile, the highest average recorded for that month since 1930, when an average of 3.82 tons of pollution was recorded for July. The recorded pollution for each month of this year since March has exceeded that for the corresponding month of 1932 with the exception of June.

Mr. Morris is now engaged in a cooperative study with the Abbott Laboratories of Chicago in which the aerodynamic qualities and travels of ragweed pollen are being investigated. Observations are being made at 30 stations across the country, and data thus obtained provide information on the sources and movements of this annoyance. Wind velocities play an important part in scattering the pollen, which may travel great distances, according to Mr. Morris.

School Buildings Found Mostly Unfit

Approximately 80% of all rural school buildings and 60% of all elementary school buildings in cities throughout the country are "entirely unsatisfactory" and should be replaced immediately by modern structures, according to Dr. N. L. Engelhardt and Dr. George D. Strayer, Professors of Education at Teachers College, Columbia University. This assertion was made in the report of a survey of school buildings.

The report charged that thou-

sands of children are housed yearly under conditions that do not meet even the minimum standards of lighting, ventilation, sanitation, or safety.

The educators recommended Federal assistance for school buildings, Doctor Engelhardt declaring that "none of the $3,300,000,000 worth of public works funds could be expended to better advantage than it could in providing adequate housing for school children."

Good school buildings are just as necessary for the advancement of education as good school teachers, the report declared.

Metropolitan Life Building

Through courtesy of the office of Clyde R. Place we are able to supply a more extended statement of the personnel which took part in the design and construction of the new unit in the home office group of the Metropolitan Life Insurance Company than that listed on the Table of Contents page of our August, 1933, issue. As that list appears to have been incomplete we are glad to print the following more extended one. Waid and Corbett were the architects. The consulting engineer for heating, ventilating, and air conditioning was Clyde R. Place, while Kaiser, Muller and Davies acted as consultants on electrical engineering. The American Fire Prevention Bureau designed the fire protection system, Carrier Engineering Corporation installed the air conditioning, and Starrett Bros. and Eken were the general contractors.

August Building Total Larger Than Any this Year

August construction contracts totaled $106 million according to F. W. Dodge Corporation; this was a gain of about 28% over July and was the largest monthly total thus far reported for 1933. For the elapsed eight months of 1933 contracts totaled $621 million as against $930 million for the corresponding eight months of 1932.

The gain in contracts over July was entirely due to increased activity in public works and public utilities. For the former the August total was somewhat more than twice as large as the July figure; for the latter, August awards were almost five times as large as in July. Public works contracts were considerably smaller, however, than in August, 1932, but public utilities awards were more than twice as large as those recorded in August of last year.

Residential awards in August showed a total of $22 million as against $24 million for July and $21 million for August, 1932.

NRA MEMBER U.S. WE DO OUR PART

HEATING AND VENTILATING is a member of the Periodical Publishers Institute, has signed the Blanket Code certificate of compliance, and is observing the Code submitted by the Institute.

44 Foreign Heating Companies Owned by American Manufacturers

Forty-four foreign establishments representing an investment of $18,022,292 are engaged in the manufacture and sale of heating and ventilating equipment as branch plants of American industrial companies. The greater part of the investment is in plants situated in Canada.

This information was made public as part of a report made by the Department of Commerce to study the effect of the tariff walls between this country and Canada and Great Britain which has resulted in continued migration of American industry to foreign countries in the form of branch plants. American industry has a total of 1819 units abroad, representing an investment of over $2 billion.

COMING EVENTS

OCTOBER 2-6, 1933. Thirteenth Annual Meeting of the American Welding Society, to be held in Detroit, Mich. Headquarters at the Book-Cadillac Hotel.

DECEMBER 4-8, 1933. Fifty-Fourth Annual Meeting of the American Society of Mechanical Engineers, to be held in New York. Headquarters at 29 West 39th Street.

DECEMBER 6-9, 1933. Twenty-Ninth Annual Meeting of the American Society of Refrigerating Engineers, to be held in New York. Headquarters at the Hotel New Yorker.

FEBRUARY 5-8, 1934. Fortieth Annual Meeting of the American Society of Heating and Ventilating Engineers, to be held in New York. Headquarters at the Hotel Biltmore.

FEBRUARY 5-9, 1934. Third International Heating and Ventilating Exposition, to be held in the Grand Central Palace, New York.

Oil Burner Industry Sets Up Code Administration

With the holding of the organization meeting of the Code Authority in Washington September 28, the oil burner industry set up its first machinery for administration of the Code of Fair Competition as approved by President Roosevelt September 18.

The following officers of the Code Authority were elected: Morgan J. Hammers, chairman; Haldeman Finnie, L. E. Johnson, and R. S. Bohn, vice-chairmen, and Harry F. Tapp, executive secretary-treasurer. The office of the Code Authority has been established at 342 Madison Ave., New York.

Toridheet Appoints New Dealers

Cleveland Steel Products Corp., Cleveland, recently appointed Coleman-Halloran, Inc., Paterson, N. J., and Lewis & Carnell Co., Philadelphia, distributors of its Toridheet oil burners.

Dealers appointed in the past few weeks are: Superior Heating Co., Chicago; Laramie Sales Co., Chicago; Hartley Bros., Philadelphia; A. W. Meyer, Ridgefield, N. J.; and E. E. Johnson, Shelter Island, L. I., New York.

Arc-Welding Handbook Covers Pipe Welding

Latest authoritative information on the design and procedure for arc welding is available in a single volume in "Procedure Handbook of Arc Welding Design and Practice," published by The Lincoln Electric Co., 12818 Coit Road, Cleveland. Subjects treated in the eight sections of the book include: welding methods and equipment; technique of welding; welding procedure,

speeds and costs; structures and properties of weld metal; weldability of metals, and typical applications of arc welding in manufacturing construction and maintenance, in which pipe welding is taken up in detail.

The book contains 434 pages, bound in semi-flexible imitation leather, and has been made 5¾ in. by 9 in. for convenience for both shop and desk use. Price $1.50.

Motorstoker Makes Announcements

Motorstokor Corp., 290 Hudson St., New York, has elected four new directors, as follows: William Tudor Gardiner, recent Governor of Maine, George H. Townsend, president of Hurley Townsend Corporation, Edward L. Green, Congoleum-Nairn Corporation, and Norton T. Brotherton, Lambert & Feasley.

H. L. Siegmund has been placed in direct charge of dealer sales in the capacity of sales manager.

J. C. McCurdy is now in direct charge of retail sales in New York, as metropolitan sales manager.

Motorstokor reports that its sales to date are 32% ahead of 1932 and only slightly behind 1931. Sales for the last four months are considerably ahead of 1931.

Publishes Calculation Sheets

Walter J. Ottinger, 1893 East 55th St., Cleveland, has published a data sheet for calculations for mechanical warm-air furnace systems designed according to the National Warm Air Heating and Air Conditioning Association tentative code. The sheets follow the tentative code without deviation and are designed to make room for all data necessary, including computations. The prices are 10 cents each when sold singly, 15 sheets for $1, not including postage.

Majority of Oil Burners Sold in Lower Income Field in 1932

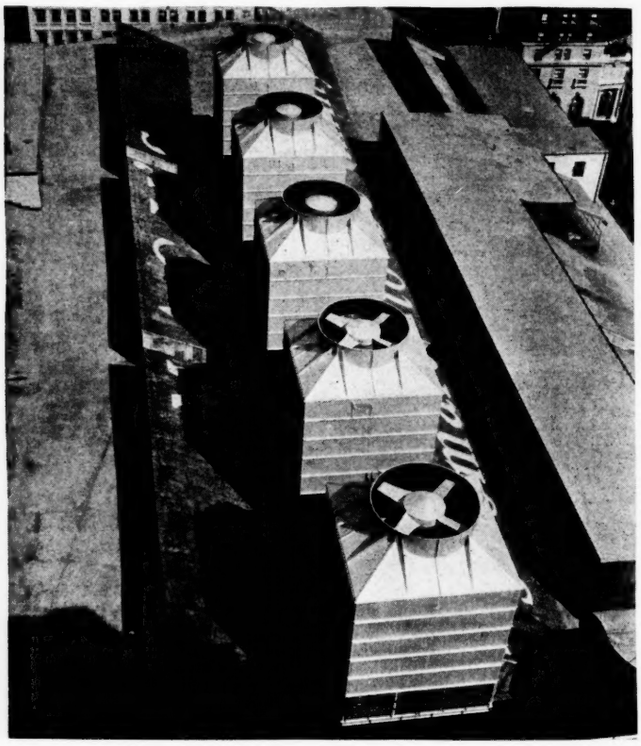
Families in the lower income brackets are purchasing more oil burners than formerly, according to E. V. Walsh, general sales manager of Timken Silent Automatic Company, who states that during the past year 63% of the burners sold by that company went into homes with less than $5000 yearly income. Mr. Walsh further states that 31% of the sales were made to families having incomes of between $2000 and $3000. Prior to 1932, few people with incomes under $7500 per year and living in homes valued at less than $20,000 were considered as prospects for oil heat.

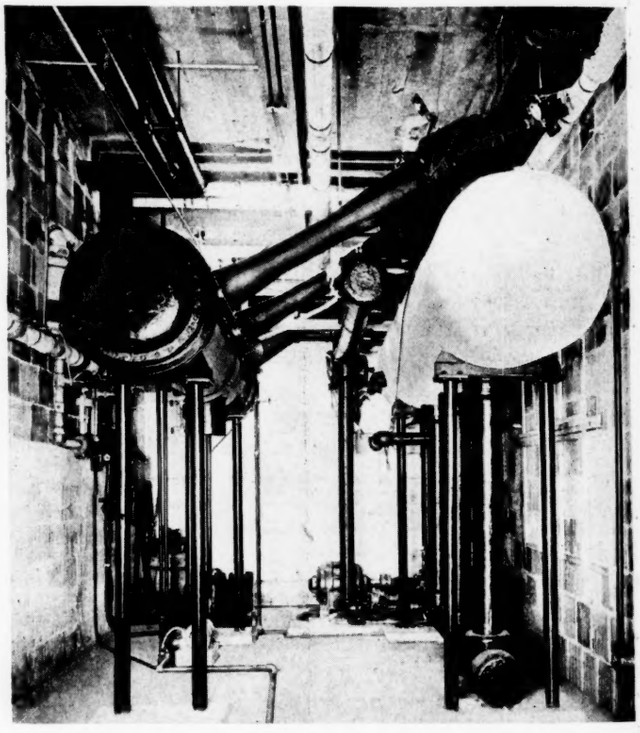
Preferred Utilities Buys Draft-A-Justor

The Preferred Utilities Co., 33 West 60th St., New York, recently purchased the business of the Draft-A-Justor Corp., formerly of Chicago.

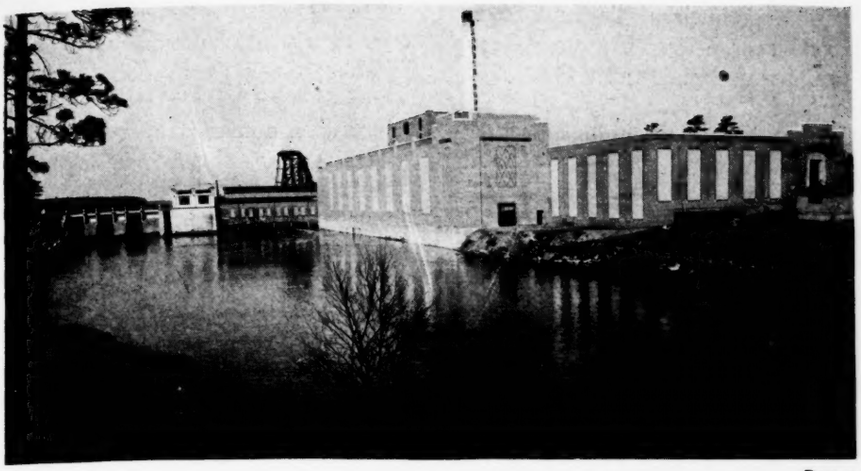
Finck Starts Heat Transfer Laboratory

Establishment of the J. L. Finck Laboratories, 1447 Oak St., N. W., Washington, D. C., equipped for testing and development work in the field of heat transfer and insulation, has been announced. The laboratories are in charge of J. L. Finck, formerly physicist with the





(Left) Looking down into the tops of the new Foster Wheeler induced draft cooling towers on Macy's roof, New York. The fans are 14½ ft. in diameter. These towers result in a $10,000 a year saving in the cost of water alone. (Right) The 82-ton Foster Wheeler vacuum refrigeration equipment, part of the modernized air cooling system of the Paradise Restaurant, New York. The revision of the air conditioning system was depeloped by Edwin A. Kingsley, consulting engineer, and was installed by the York Ice Machinery Corporation. Steam is supplied to the refrigerating unit by the New York Steam Corporation.



Power

The new air conditioned factory of the Blandin Paper Co., Grand Rapids, Minn., made windowless in order to provide proper conditioning for the paper-making process.

Bureau of Standards. Tests are scheduled on the thermal conductivity of materials at and below room temperature, on heat transfer through complete wall structures, and on the thermal conductivity of refractory materials such as fire brick, refractory brick, etc., at various temperatures up to 2000°.

Building Operations Increased During August

Building permit reports received by the United States Department of Labor indicated an increase in number of total building operations of 6%, and a decrease in total expenditures for building construction of 2.2% in 774 identical cities of 10,000 population or over in August as compared with July. The same index shows a decrease of 12.9% in number and 11.3% in total expenditures for new residential buildings over the same period. The number of permits issued for new non-residential buildings during August increased 7.3% over July, but indicated expenditures decreased 4.8%. Permits for additions, alterations, and repairs over this period increased 8.2% while indicated expenditures for this type of work increased 10.3%.

Eadie on NRA Code Committee

We are informed that the council of the A.S.H.V.E. has tentatively accepted the NRA code as sponsored by the American Society of Civil Engineers to cover professional engineers who function in the construction industry. This code is one of the divisional codes of the general plan headed by the Construction League of the United States. President Jones has designated John G. Eadie, of the firm of Eadie, Freund and Campbell, New York, to act as the A.S.H.V.E. representative on the National Control Committee set up by the A.S.C.E. Code.

Plans Progressing for Third Heating and Ventilating Exposition

Arrangements are progressing rapidly for the Third International Heating and Ventilating Exposition, to be held in Grand Central Palace, New York, in conjunction with the annual meeting of the A.S.H.V.E., February 5-9. The exhibition will be under the management of International Exposition Company, and will be personally supervised by Charles F. Roth, who was similarly responsible for the two previous exhibitions.

Automatic Products Co. Makes Announcements

Automatic Products Co., 121 North Broadway, Milwaukee, Wis., announces new list prices on all control equipment, effective August 15, all previous quotations having been withdrawn. A change in discount schedules also went into effect as of that date.

News of the Month

New representatives of the company were recently appointed, as follows: Carman Adams, Inc., 2970 West Grand Blvd., Detroit; A. A. Anderson, 715 Union Bldg., Cleveland; J. H. Murphy, 2823 Harrison St., Evanston, Ill.; D. O. Eggert, Box 952, Webster Groves, Mo.

Power for Conditioning Increases Load on Utilities

About 30 sizable installations of air conditioning equipment have been made in Detroit this year, according to S. S. Sanford, Detroit Edison Company.

The Commonwealth Edison Co., Chicago, has contracted to supply power for 26 large air conditioning installations in Chicago since the first of the year. This has increased the station load by more than 1100 kw.

Coal Heating to be Discussed by Mining Engineers

"Selection of Coal for Small Stokers" will be discussed in a paper to be presented by C. A. Reed, chief combustion engineer, Pittsburgh Coal Company, before a meeting of the Coal Division of the American Institute of Mining and Metallurgical Engineers, to be held at Columbus, Ohio, October 27-28. "Utilization of Pennsylvania Anthracite," a paper by Allen J. Johnson, director, Anthracite Institute Laboratory, Primos, Pa., will also be presented at the meeting.

Book Describes Pipe Welding Process

Latest developments in oxy-acetylene welding practice are described in "Fabrication of Oxwelded Piping," a 160-page book distributed without charge by The Linde Air Products Co., 30 West 42nd St., New York. Step by step procedures of oxy-acetylene welding steel, cast-iron, copper, brass, and lead piping, and for making fittings right on the job, along with 75 illustrations and 20 reference charts make this a comprehensive text on building and industrial pipe welding.

News of the Month

Other subjects covered are the testing and qualifying of welders, inspection methods while the work is in progress, testing welded joints, and cost estimating.

Manufacturing Employment Up

Employment in plants manufacturing steam and hot water heating apparatus and steamfittings increased from 43.0 in July to 46.6 in August, the figures being in per cent of the 1926 average. Payrolls in the same plants rose from 27.4 to 30.6, according to the U. S. Department of Labor.

Coppus Appoints Rogers

Coppus Engineering Corp., Worcester, Mass., has appointed Frederick D. Rogers, 80 Federal St., Boston, to handle sales in Maine, New Hampshire, Vermont, and Massachusetts east of Worcester County.

New Representatives Appointed by Sarco

The Sarco Co., New York, announces the following new representatives: E. R. Clement, 1414 West Broad St., Stratford, Conn.; Evans Construction Co., Scottsdale, Ariz.; P. J. O'Meara, 50 Hawthorne St., San Francisco, Calif.; Geo. R. MacGregor, 706 Cottage Grove Ave., South Bend, Ind.; J. E. Pearson, 3805 Montana St., El Paso, Tex., and C. H. Penningroth, 1617 Curdes Ave., Ft. Wayne, Ind.

Codes Covering Furnaces and Parts Progressing Rapidly

The NRA code for warm-air furnace manufacturers was filed with the Administrator of NRA, August 29, and an early hearing is scheduled. The code for warm-air register and metal grille manufacturers was filed August 30, while that covering furnace pipe and fittings has been completed.

Furnace Manufacturer Compiles Data Sheets

Data sheets, simplifying computations for fan blast heating and for computing the cooling load, have been prepared by Dail Steel Products Co., Lansing, Mich., for distribution to the warm-air heating industry.

The sheet for fan blast work is based on material in the 1933 *Guide*, the new Fan Blast Code adopted by the N.W.A.H. & A.C.A., and other sources. Data used in the cooling sheet, obtained from the same sources, are based on a predetermined temperature and humidity condition. Factors are provided to fit this arbitrary condition, instead of using the various coefficients of heat transmission with the varying temperature rises, thus eliminating considerable calculation work.

These sheets are available to dealers and installers in lots of 50 or more at a nominal charge. A blue print of a fan blast installation, a trunk schedule showing sections of main trunks, branch sizes, warm-air and return grilles, and a completed data sheet to cover the layout, are sent with each order. The Dail Company offers to cooperate with any manufacturer in making this help available to the general trade. The compilation of the sheets was in charge of H. B. Huffaker, heating engineer of the company.

Phillips New Motor Wheel Service Manager

George H. Phillips, formerly service engineer for Motor Wheel in the East, has been appointed service manager of the Heater Division of Motor Wheel Corporation, succeeding A. E. Nussdorfer, who is now acting as assistant engineer in the Heater Division Laboratories. Adolf Frantz has assumed Mr. Phillips' former duties in the East.

Rome Radiation Moves Chicago Branch

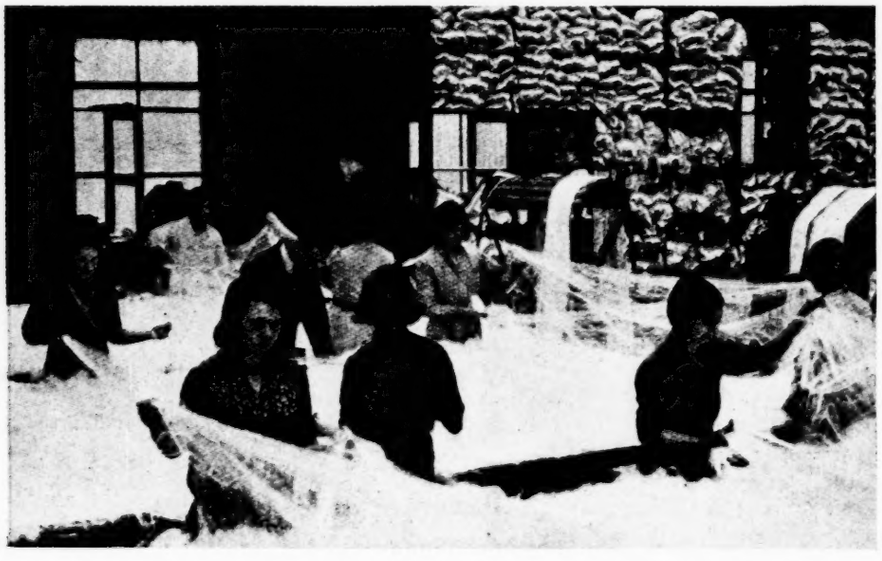
Rome Radiation Co., Division of Revere Copper and Brass, Inc., Rome, N. Y., removed its Chicago branch office from 705 Daily News Building to 1488 Merchandise Mart. L. O. Williams is in charge of the branch.

Foreign Distributors Appointed by Petro

Distributors in Argentina and Turkey were recently appointed by Petroleum Heat and Power Co., Stamford, Conn., as follows: E. Rochette, Paraje Barolo 359, Buenos Aires, Argentina, S. A.; F. W. Dekkers, Sair Ziya Pasha, Cad. No. 72, Galata, Istanbul, Turkey.

Louisville Contractors Occupy New Quarters

Heating and Piping Contractors Louisville Association, for a considerable time without headquarters or meeting place, has leased office space in the Builders Building, 630



Preparing the long fibers in making glass silk in a Glasgow, Scotland, factory. This insulation, which has become popular recently in Great Britain, possesses a high tensile strength and has a low transmission coefficient.

South Fifth St. The Louisville group undertook this step in anticipation of increased activity under the NIRA.

Petro-Nokol Makes Western Appointments

Petroleum Heat and Power Co., Stamford, Conn., has appointed the following as distributors: Aetna Oil Service, Inc., Louisville, Ky., National Supply Co., Toledo, Ohio, and Foster Auto Supply Co., Denver, Colo.

Lanigan Joins George N. Wallace Co.

James J. Lanigan, formerly connected with Pierce, Butler & Pierce Mfg. Corporation in the capacity of purchasing agent and later as assistant to the general sales manager in charge of specialty sales, has become associated with the George N. Wallace Co., consultant on sales and sales promotion, with offices at 21 East 40th St., New York.

Rome Radiation Appoints Sales Representatives

Rome Radiation Co., Division of Revere Copper and Brass Inc., Rome, N. Y., has appointed Arthur R. Bradley, 816 Livingston Ave., Syracuse, N. Y., as its sales representative for the states of New York and Vermont, Western Massachusetts, and Erie County in Pennsylvania.

A. S. Maxwell

A. S. Maxwell, sales and advertising manager of J. H. Williams & Company, died at his home in Garden City, Long Island, N. Y., Saturday, September 9. He had suffered for the past two years from a severe rheumatic condition which fatally affected the heart.

Mr. Maxwell is survived by his widow, son and daughter.

NEW CATALOGS

Amthor Testing Instrument Co., Inc., 309 Johnson St., Brooklyn, N. Y., has issued Bulletin No. 108 describing direct-reading precision hygrometers, recorders, and other instruments for determining air conditions. Single page, standard size.

Chicago Pump Co., 2336 Wolfram St., Chicago, has published a new general catalog describing its products. The catalog consists of about 40 individual bulletins, each confined to a particular line of pumps and equipment, all bound together in a substantial loose-leaf binder. Capacities, discharge heads, power requirements, and other engineering data are included; standard size, 400 pages.

Electrol Incorporated, 227 East 45th St., New York, has issued a booklet, "The Easiest and Cheapest Way to Heat Your Home," describing the construction and operation of the Electrol-Kewanee heating unit; 32 pages, 7¾ in. × 10¾ in.

Inland Steel Co., First National Bank Building, Chicago, has published a booklet entitled "Sizes We Roll and Standard Extras," containing data on bars, shapes, plates, and semi-finished steel; pocket size, 41 pages.

Jenkins Bros., 80 White St., New York, has published Catalog 23, covering 400 types of Jenkins valves. Features of design and construction are fully described, and complete engineering specifications are included; 264 pages.

Jas. P. Marsh Corp., 2073 Southport Ave., Chicago, has issued general Catalog 68, describing and illustrating its line of heating equipment and industrial instruments. Specifications and engineering data for all products are included. Standard size, 55 pages.

Mason-Neilan Regulator Co., 1190 Adams St., Boston, Mass., has published Bulletin 2000-c, describing and illustrating the construction and operation of its line of compensated pressure control instruments. Standard size, 24 pages.

Preferred Utilities Mfg. Corp., 33 West 60th St., New York, has issued its general catalog for the season 1933-1934, describing and illustrating oil-burning equipment and accessories handled by it. Standard size, 96 pages.

Taylor Forge & Pipe Works, P. O. Box 485, Chicago, has published Catalog 33 describing and illustrating manufacture and applications of Taylor spiral pipe, riveted, or welded. Included are engineering data, charts, and formulas for hydraulic flow computations. Standard size, 63 pages.

The Titusville Iron Works, Co., Titusville, Pa., has issued catalogs describing new steel heating and power boilers. Catalogs are standard size and contain complete specifications.

25 Years Ago in

The Heating Ventilating Magazine

OCTOBER, 1908

IN A PAPER read before the Congress of the Royal Sanitary Institute, Cardiff, England, July, 1908, Reginald G. Kirkby recommended that for schoolrooms "a standard of purity be required rather than certain fixed rules as to cubical content. Any amount of space can be had in a room, and yet the air can be as filthy as it is possible for it to be."

PERSONNEL OF THE COMMITTEE which will work for the maintenance of the new factory ventilation law in New York State is as follows: Chairman, Prof. William Kent, Syracuse, N. Y.; Prof. Rolla C. Carpenter, Ithaca, N. Y.; William Mackay, New York; William C. Vrooman, Schenectady, and E. P. Bates, Syracuse.

JAMES MACKAY, president of the A.S.H.V.E., has announced appointment of S. R. Lewis, of Chicago, as chairman of the Committee To Collect Data on Air Washers. The name of Theodore Weinshank, Indianapolis, has been added to the committee.

THE EDITOR remarks the growing custom of heating groups of buildings with either steam or hot water supplied from a central heating plant, and predicts that the time is not far distant when we will buy heat for our homes as well as for our office buildings very much as we now buy gas, water, and electric light.

CARRIER AIR CONDITIONING CO., New York, has been organized to take over the Buffalo Forge Company's rights in the air washers, humidifiers, and humidity controlling apparatus manufactured under the Carrier patents. J. I. Lyle, formerly New York manager for the Buffalo Forge Company, is general manager of the new company, and W. H. Carrier, inventor of the system, is the company's consulting engineer.

New Equipment

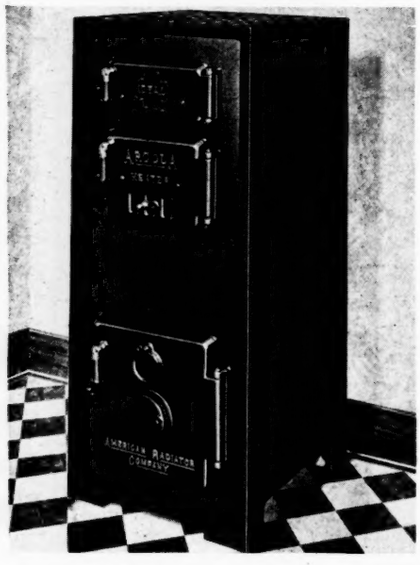
Crane Distributes New Bastian-Morley Water Heaters

Crane Co., 836 South Michigan Ave., Chicago, is distributing Kero automatic kerosene-operated storage water heaters, manufactured by Bastian-Morley Co., Laporte, Ind. The heaters are available in four sizes having storage capacities ranging from 22 gal. to 48 gal. with recovery capacities of from 15.5 gal. to 28.6 gal. per hr. at a 60° temperature rise.

Burner has a molded ceramic fuel conductor which carries the kerosene through the fuel channels of the burner where it is vaporized and rises to burn at top of chrome-steel combustion head. A heat deflector distributes the heat over the entire bottom of the heater and also serves as a condensate trap. Heat absorption is further augmented by a spiral baffle in the vertical flue. An adjustable thermostat and a constant level valve on the main burner control combustion, and two small kerosene-burning pilots provide ignition. Either galvanized steel tank or Everdur copper tank is optional.

Complete Radiator System Announced by Arco

A complete and inexpensive heating system for all-on-one floor or cellar installation in small homes, stores, and other small buildings, is offered in the new Arcola hot water radiator heating outfit, product of American Radiator Co., 40 West 40th St., New York. Equipment consists of an Arcola heater, required number of Corto radiators, and automatic control.



Arcola heater with circulating jacket

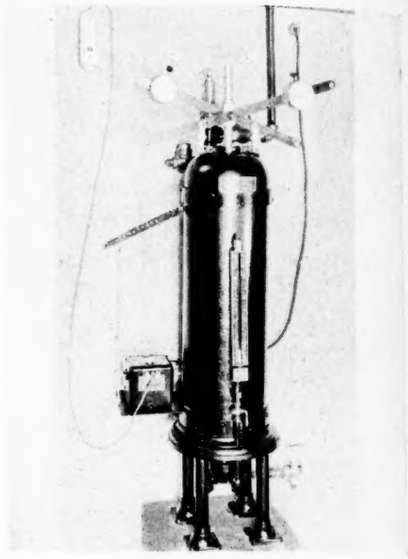
The new Arcola heater serves as combination boiler and radiator, having louvers in the top of the jacket through which warmed air is circulated into the space in which it is located. It can also be had unjacketed or, for cellar installation, with insulated jacket. The combustion space is completely surrounded by the cast-iron boiler-radiator sections. The automatic regulator, located at the rear of the heater, adjusts the drafts to maintain the combustion of the coal at a rate to produce the desired temperature.

Units are available in six sizes, having radiating surfaces ranging between 45 sq. ft. and 70 sq. ft., and carrying heating loads ranging between 75 sq. ft. and 400 sq. ft.

Regulator Maintains Uniform Low Pressure or Vacuum

The Merco regulator, recently announced product of The Merrill Co., Inc., 98 Granite St., Boston, Mass., is designed to control the combustion of coal, oil, or gas under low-pressure boilers in heating systems and industrial processes. It can be used to regulate a pressure-reducing valve, the dampers on coal-fired boilers, or the supply valves on gas or oil burners. The manufacturer states that it will control combustion to maintain a pressure of 5 in. below atmospheric, and can be designed to maintain 29 in. of vacuum when required. The regulator may be used for pressures up to 5 lb.

When used in conjunction with an oil burner the regulator controls the oil and primary air supply on the burner in addition to the secondary air damper, which is arranged to close tightly when the burner is shut down, eliminating wasted heat resulting from influx of cold air. When applied to a gas burner, a number of mercury-sealed valves,



Merco regulator

opened successively by a cam shaft, regulates the fuel supply, and secondary air is controlled as in the case of the oil burner.

The regulator is actuated by a cylinder floating on mercury and counter balanced to the desired pressure or vacuum.

New Lubricating Oil Has High Film Strength

E. F. Houghton & Co., 240 West Somerset St., Philadelphia, has developed a polymerization treatment for mineral oils which is said to impart extremely high film strength to these lubricants. This treatment results in a complete rearrangement of the molecular structure of the oil without in any way altering its chemical composition. The products are known as Sta-Put lubricants.

They are made in three series, and are available in grades for nearly every type of industrial equipment.

Condensation Pump for High or Low Returns

Hi-Lo condensation return pumps, available from Yeomans Brothers Co., 1433 Dayton St., Chicago, are designed for either floor mounting or flush mounting, and are equally adaptable for use with high or low returns.

Motor and pump assembly is mounted on a heavy gauge steel receiver, hot-dipped galvanized, and provided with a steam-tight cast-iron cover. The enclosed bronze impeller is direct-driven through a

Hi-Lo condensation return unit

large ground steel shaft by a capacitor-type motor, rigidly centered on a machined bracket. The motor is equipped with ball bearings, and the pump shaft runs in self-lubricating sealed sleeve type bearings. The unit is provided with built-in automatic electric controls, and is protected by an overload circuit breaker with hand reset.

Units are available in two sizes. The smaller, driven by a ¼-hp. motor, capacities up to 10,000 sq. ft. of direct radiation, is for use with pressures between 5 lb. and 15 lb. The 5 lb. to 20 lb. unit is equipped with a ½-hp. motor, and will handle from 1000 sq. ft. to 15,000 sq. ft. of radiation.

Ken-Bar Watertight Conduit for Underground Steam Mains

Waterproof conduit, designed to reduce labor of installation, has been developed by The Ken-Bar Co., 79 Milk St., Boston, Mass. Ken-Bar Konduit utilizes Johns-Manville Transite pipe for the outer covering, and is made up with rubber-sealed Simplex sleeve joints, guaranteed by the manufacturer to be watertight under a pressure of 80 lb. No underdraining is required with this conduit, and it can be laid in wet ground or under water if desired.

For a long run of pipe, waterproofed concrete pits are first constructed at a determined distance apart—say 300 ft. to 400 ft. Transite pipe of the required diameter is then laid in the trench, correctly graded and firmly embedded, joints with the concrete walls of the pits being made with plastic cement. A temporary trench sufficiently long to accommodate a length of pipe is then dug at one of the pits, and a cable extended through the conduit to the next succeeding pit, where a suitable winch and tackle is located. The lengths of pipe are then carefully lined up and welded and, supported on cradles with rollers secured to the pipe at intervals of about 12 ft., the pipe is pulled progressively through the conduit as the joints are completed. Sectional insulation covering is applied as the pipe is placed in the conduit.

Suitable fully guided and anchored expansion joints are placed in the pits, with an especially designed anchor plate between them. Where pipe is to be laid from building to building, it is often possible to dispense with the pits, laying the pipe in conduit directly from one building to the next.

Carryola Vaporizing and Circulating Humidifier

An electrically-operated vaporizing humidifier, enclosed in a vase-shaped container, has been placed on the market by The Carryola Company of America, 1669 South First St., Milwaukee, Wis. Evaporation of water is accomplished by an immersion heater mounted in a float chamber in which a small quantity of water is heated at one time. As the vapor rises from the heating chamber it is discharged into the room by a quiet induction motor-driven fan. A snap switch starts and stops the humidifier, and an automatic safety switch protects the device from damage when the water reserve is exhausted.

Humidifier body is of cast aluminum, 13½ in. high and 11⅜ in. in diameter, and is available in four colors or in plain polished finish. It has a capacity of 2¼ gal. and will evaporate 1 gal. of water every 4 hr.

Rotameter Flow Meters Are Unique in Design

Schutte & Koerting Co., 12th and Thompson Sts., Philadelphia, is marketing the SK Rotameter, an unusual type of flow meter which has been successfully applied to the measurement of flow of ammonia, sulphur dioxide, freon, and other refrigerants, in addition to a wide variety of other fluids, both liquid and gaseous.

The meter consists essentially of a vertical transparent tube, having a tapered bore, with the smaller diameter at the bottom. Within the tube is a top-shaped float held in suspension by the upward flow of the fluid to be metered. The float is entirely free and is caused to rotate rapidly by means of slots cut in its head. The annular space between the tube and the float increases as the float is carried upward by an increasing flow, and the position of the float in the tube is therefore an indication of the rate of flow, and the calibration curve is practically a straight line. Corrections for differences in specific gravity, temperature, pressure, etc., can be easily made.

Rotameters are available in a number of types and sizes to meet the requirements of various installations and fluids.

Pipe Union for High Pressures Has Four Seats

An improved design of pipe unions for high-pressure steam, oil, gas, and water lines is offered in the U. S. union, distributed by United

U. S. pipe union assembly

New Equipment

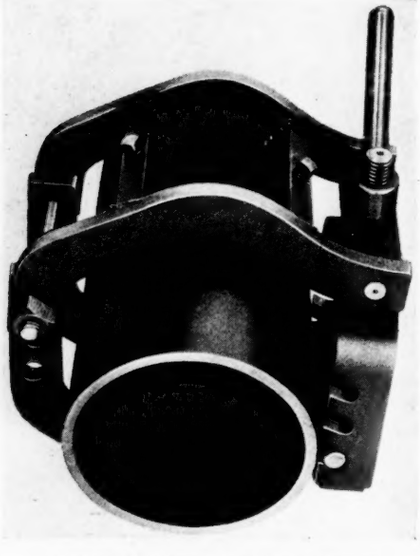
Superior Union Co., subsidiary of Mergenthaler Linotype Co., 29 Ryerson St., Brooklyn, N. Y., the manufacturer.

This fitting has two serrated ends, one hard and the other soft, forming four distinct seats, an arrangement said by the manufacturer to give protection against leakage superior to that previously obtained with the single seat of the ball-type union. The joints can be used a number of times, as a single making up cannot injure the four separate seats. They are available in both black and cadmium-plated.

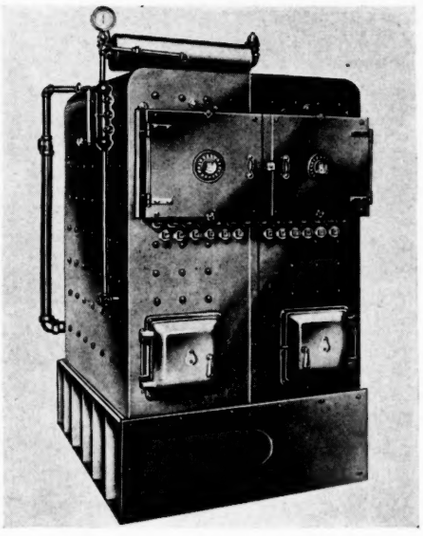
Pipe Welding Clamp is Adjustable

Oster-Williams, 2057 East 61st Place, Cleveland, has announced the Bull Dog adjustable pipe welding clamp, for holding pipe ends rigidly in line during the welding operation. It is available in two sizes, to accommodate pipe from 4 in. to 6 in., and from 8 in. to 12 in.

A single lever controls the action of the clamp, simplifying the operation of applying and removing it. The two lengths of pipe are automatically centered, and adjustable screw spacers retain them at the correct distance apart for welding. The clamp's open construction leaves an unusually large space for tacking. Welded steel construction is used to give high strength with minimum weight.



Oster-Williams welding clamp



Spencer steel boiler for oil burning

Spencer Markets Oil-Burning Boiler

A welded steel boiler designed expressly for oil firing has been added to its line of heating boilers by Spencer Heater Co., Williamsport, Pa. The boiler is available in capacities ranging from 2250 sq. ft. to 40,000 sq. ft. of steam radiation, to meet nearly any residential or small commercial requirement.

Combining fire-tube with water-tube design, the boiler is ruggedly constructed of 3/8-in. flange boiler quality steel, with copper bearing steel tubes. The manufacturer states that the large combustion chamber is so designed that even the heavier grades of fuel oil may be burned smokelessly, and that long gas travel and extensive heat-absorbing surfaces, correctly proportioned, insure high efficiency. Any standard make of oil burner can be used, and it is said that boilers up to the 14,000 sq. ft. capacity can be passed through a 3-ft. door opening.

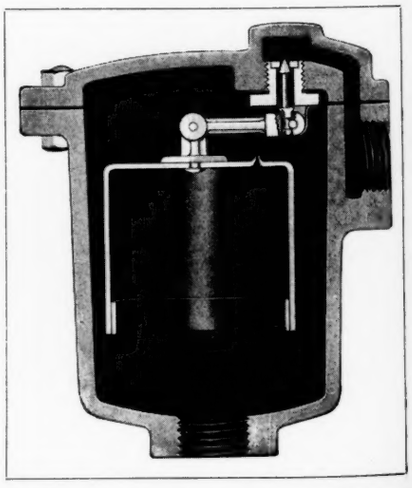
Cook Offers Line of Furnace Controls

Type 15 warm-air furnace control switches for low-voltage operation have been announced by the Cook Electric Co., 2700 Southport Ave., Chicago. Switches are of the magnetic type, compensated for wear, and positive and quick acting on both make and break. The actuating element is a rugged bimetal helix, properly heat-treated, aged, and calibrated.

Units are available in three models. Type 15-6 is a high-fire switch, designed to check the fire when a predetermined bonnet temperature has been reached. It is adjustable within a range of 100° to 350°, with a differential of 15°. Type 15-7 is a blower switch, with adjustable range of 100° to 300° and a differential of 35°. The Type 15-8 is a combination furnace control, incorporating high-fire switch with blower control, and is provided in addition with a safety contact which will continue the blower in operation should the fire fail to check for any reason, preventing damage to the furnace, and serving as a warning to the owner that the system is not functioning properly. The furnace temperature setting is easily accessible at any time, but the blower setting is inaccessible after installation to prevent tampering.

Marsh Announces Inverted Bucket Trap

Jas. P. Marsh Corp., 2073 Southport Ave., Chicago, is marketing the Marsh No. 500 inverted bucket type steam trap, designed for use in applications where considerable volume of condensation is to be handled. This trap, which combines simple rugged construction with simplicity of operation, is self-venting and intermittent in operation. Between cycles of operation the float is in the raised position being filled with steam and air, and the valve pin is held closed against the seat. As condensation rises in the trap body the water ejects the steam



Marsh No. 500 inverted bucket trap

and air through the vent opening in the top of the float causing it to lose its bouyancy. As the float drops the valve opens and the condensation is drained out.

Body and cover are of cast iron, and the bucket is of seamless copper. Pins, valve, and seat are of stainless steel, and operating linkages are of cast bronze. All piping connections are made to the trap body which permits removal of the trap cover without disturbing the piping. The entire operating mechanism lifts out with the cover, making all parts easily accessible for inspection and repair.

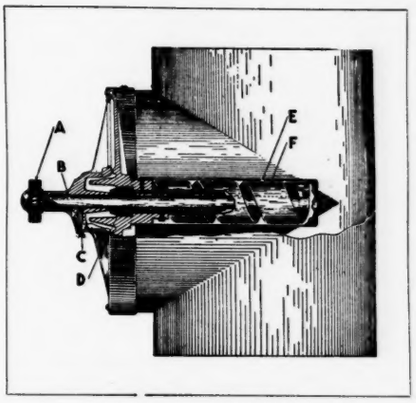
These traps are available in three sizes—½ in., ¾ in., and 1 in., and can be used with working pressures up to 125 lb.

Electric Device Controls Drafts on Hand-Fired Equipment

Russell Electric Co., 340 West Huron St., Chicago, is marketing the Hold-Heet electric motor draft regulator for automatic control of combustion in hand-fired furnaces and boilers.

An electric motor operates a lever which is connected through chains and a system of pulleys to the draft and check damper of the heater in such manner that the check damper is open when the draft is closed, and conversely. Operation of the motor is controlled by a room thermostat, connected to it through a transformer. Electric energy is consumed only during the period while the motor is in operation, in opening or closing the draft, approximately 1 min. per cycle. Equipment includes the motor and lever assembly, thermostat, transformer, and the necessary chains, pulleys, wiring, etc.

Russell draft control



Section through McWilliams draft regulator

Automatic Draft Regulator Thermostatically-Operated

McWilliams Electric Co., 58 East Washington St., Chicago, is marketing the Type-A automatic draft regulator for domestic and small commercial heating boilers. The device is installed in the smoke pipe connection, and adjusts the draft to maintain uniform combustion conditions by opening and closing a cold air shutter. It may also be used to maintain a uniform draft in oil-fired heaters during starting up and running periods, and to prevent excessive rise in temperature in gas furnace flue gases.

Shutters are actuated by a bimetal coil, F, fixed to the end of a chrome-plated shaft, B, supported in a chrome-plated steel cup, E, which is inserted in the path of the flue gases. The regulator is set to maintain a desired combustion rate by loosening the set screw, C, and turning the knob, A. The shaft is supported in a graphite-pack-bearing, D. As the temperature of the flue gases rises, the free end of the bimetal coil, attached to the shutter, turns to open the shutter, cutting down on the draft. The regulator is made in three sizes to meet all residential requirements, and is built to order in Type-B models, for commercial applications.

Emerson Markets High Torque Capacitor Motors

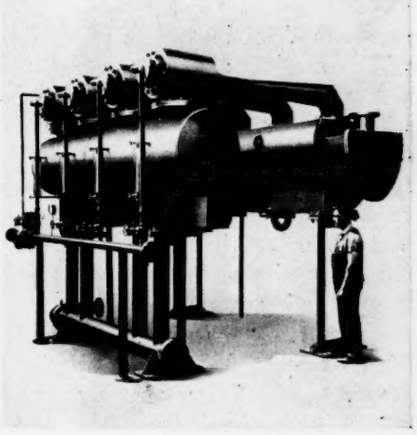
The Emerson Electric Mfg. Co., 2018 Washington Ave., St. Louis, is marketing a new line of high torque capacitor motors, recommended as having characteristics particularly adapted for oil burner, stoker, and household refrigerator drive. Motors are available in sizes from ⅛ hp. to 1/3 hp. Performance is equivalent to that of a repulsion-induction motor, plus added quietness and simpler construction.

Ingersoll-Rand Makes Vacuum Refrigeration Unit

Ingersoll-Rand Co., 11 Broadway, New York, is manufacturing a line of steam jet refrigeration units for air conditioning and industrial process applications. They are available in a number of forms and a wide range of sizes to meet various space and capacity requirements.

Steam jet compressors are of welded steel construction with steel steam chests and nozzles of special alloy, screw-assembled. Nozzles are accurately machined in accordance with turbine practice to correspond with the pressure for which they are designed. Evaporators are of electrically-welded steel, and are available in either the horizontal or the vertical type. The spray water system is designed to suit the local conditions, depending upon whether the chilled water return is siphonic, gravity, or forced circulation. Automatic liquid level control is furnished to continuously maintain the necessary static head on the suction of the chilled water removal pump.

Where surface condensers are specified, tubes are of brass, rolled rigidly into tube sheets at both ends. Condenser shell is built with a flex-



Ingersoll-Rand vacuum refrigeration unit

ible expansion element to provide for differential expansion of tubes and shell. Barometric condensers are either of cast-iron or steel-plate construction, depending upon water conditions. Air ejectors and other types of vacuum pumps are of Ingersoll-Rand construction. Cameron Motorpumps, products of a division of this company, are used for circulating pumps, chilled water pumps, and condensation pumps.

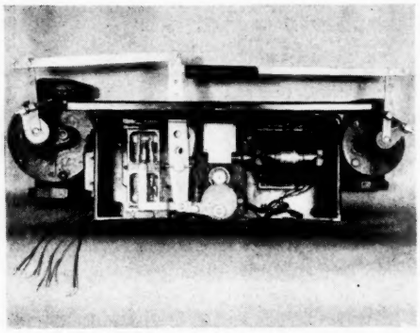
The manufacturer has published a bulletin entitled "Steam Jet Vapor Refrigeration Units," discussing the theory and practice of water-vapor refrigeration, and describing these units.

Temperature Controller for Varying Heat Demands

Automatic Temperature Control Co., Inc., 34 East Logan St., Philadelphia, has recently placed on the market the Type 305 multi-position temperature controller for use in large oil-burning applications where the heat demand is subject to wide variations over periods of varying duration. It is designed to be actuated by an instrument having five separate contacts—two on either side of the normal setting, which can be obtained through the use of available relays.

Through a simple positive limit switch arrangement, each intermediate contact between extreme low and extreme high contacts in the actuating instrument has two definite valve positions so that on making one of these contacts, following a drop in temperature, the valve opening and, hence, the resultant fuel supply is greater than when the same contact is made following a rise in temperature. The fuel supply is therefore kept more consistent with the demand. Fuel and air valves having similar flow characteristics and individual maximum and minimum adjustments can be provided for use with Type 305 controller. With valve openings set for desired fuel-air ratio, this ratio is maintained throughout complete travel of the valves.

These controllers are made in three sizes, designated A, B, and C, having rated pulls at the end of the operting levers of 30 lb., 125 lb., and 200 lb., respectively.



Type 305 multi-position temperature controller

Fire Alarm Actuated by Sprinkler System

Apparatus for connecting either wet- or dry-pipe sprinkler systems directly to the municipal fire alarm has been developed by The Gamewell Co., Newton, Mass. The device, called the Sprinkler Watchman, is used in conjunction with a Gamewell fire alarm box of the master type, connected into the municipal system, so that an alarm is conveyed to the fire department instantaneously when a sprinkler head is opened.

In wet pipe systems, the Sprinklarm, manufactured by Rockwood Sprinkler Co., Worcester, Mass., is used. This device is actuated by a drop in pressure in the sprinkler piping, and it acts to open a circuit which releases an auxiliary attachment in the master box, transmitting the alarm. Since the device operates on a drop in pressure rather than on a flow of water, water hammer and other sudden surges in the water mains cannot register an alarm. This apparatus will also transmit an alarm in the event of the opening of a sprinkler head even if the main gate valve has been accidently left closed.

In dry-type systems, the flow of water opens the circuit and trips the master alarm box as before, but the Sprinklarm is not required as the air pressure is sufficient to prevent a false alarm from water hammer or pressure surges.

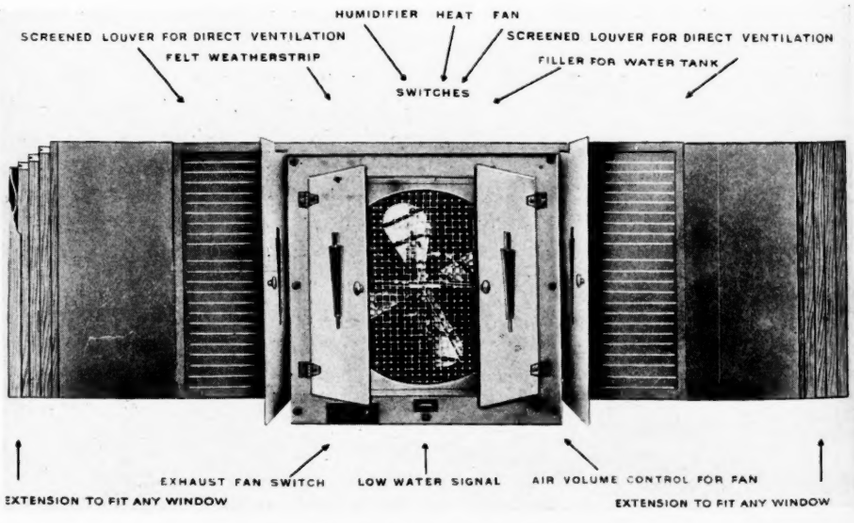
Electric Heating Device Developed by Scottish Firm

An innovation in electrical heating, the Thermovent, in which cold air is warmed within the apparatus and discharged into the room through a grille, has been developed by Thermovent, Ltd., Glasgow. Air insulation maintains the outer casing of the apparatus cool, preventing loss by radiation to surrounding walls and furniture, and making it possible to finish the cabinet in polished wood or porcelain. It is being used in hospitals, churches, and schools in Great Britain, and will be applied to heating a Cunard liner.

Burrowes Window Ventilator

A window ventilator, containing a fan, humidifier, and filter, has been placed on the market by The Burrowes Corp., Portland, Me.

The unit comes in one standard



Burrowes humidifying window ventilator

How Spencer Helps You Get *More* Replacement Business

In your campaign for boiler replacements, this Fall, it will pay you to feature Spencer Magazine Feed Boilers. They have the highest "selling efficiency" as well as the highest heating efficiency.

THE MOST ADVANTAGES

For Heating Contractors

☑ **EASY TO SELL**

Because of the large number of important owner-advantages (see next column).

☑ **EASY TO ERECT**

Tests have PROVED a Spencer can be installed faster—and with less work.

☑ **COMPLETE SIZE RANGE**

Spencer Cast Iron sectional boilers; 175 to 3,250 sq. ft. Spencer Steel tubular boilers, 250 to 15,000 sq. ft.

☑ **GUARANTEED CAPACITIES**

The capacity listed for any Spencer is the load it is guaranteed to take care of, amply.

☑ **OWNER SATISFACTION**

More than 50% of all Spencer Boilers have been bought on the recommendation of satisfied owners.

For the Building Owner

☑ **AUTOMATIC HEAT**

Spencer is the original gravity stoker, improved and perfected.

☑ **THERMOSTATIC CONTROL**

To the automatic coal action of Spencer operation we add without extra charge complete thermostatic control.

☑ **LABOR-SAVING**

You only need to put fuel in a Spencer once in 24 hours.

☑ **UNIFORM HEAT**

The always uniform fire-bed in a Spencer, assures even, uniform heat at all times.

☑ **LOWEST COST HEAT**

The Spencer Magazine Feed Boiler is specially designed to burn low cost No. 1 Buckwheat Anthracite (or small size coke).

SPENCER
Magazine Feed
BOILERS
for steam, vapor or hot water

RATE THE HIGHEST ON *ALL* THESE POINTS

Sell Spencer and you need not fear any comparison. Spencer has a Quality reputation covering more than 35 years. There is a Spencer for every size and type building—and for every fuel. Write today for the Spencer Sales Plan.

SPENCER HEATER COMPANY, Williamsport, Pa.
Division of Cord Corporation
The Spencer Foundry Company, Ltd., Penetanguishene, Ontario, and Montreal, Quebec, Canada

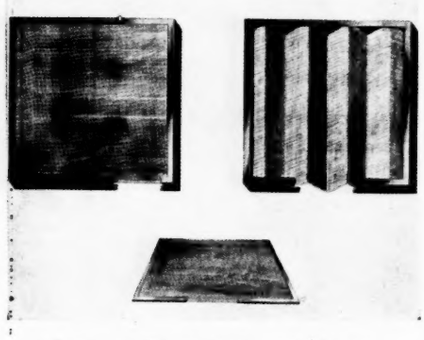
size which fits any ordinary window. It is finished in ivory with black trimmings. The unit contains a water tank with a capacity of 1½ gal., a red light giving warning when the water is low. An automatic switch turns off the vaporizer when the water is low. At the back is a glass wool filter to remove dust and pollen. A motor-driven fan, equipped with an air volume control, circulates the air. Screened louvers are provided for direct ventilation. Weatherstrips maintain a close fit between the window and the unit. A heating unit is provided to take the chill from the air.

Somers Hair Glass Filters

Somers hair glass filters, products of H. J. Somers, Inc., 1984 West Lafayette Blvd., Detroit, are made in a number of types and sizes to meet the air-cleaning requirements of hospitals, hotels, theaters, schools, etc., and for forced or gravity circulation warm-air systems.

Filters are assembled in a hot-galvanized frame, supporting galvanized hardware wire cloth in which the hair glass, finer than human hair, and each strand being at least 20-in. long, is packed. The glass fibers are flexible, and are so anchored in the frame that they cannot break off and be drawn into the air stream. Hair glass filters are non-absorptive, and non-corrosive, and are quickly reconditioned by a cold water spray for removing ordinary dust, or a hot water bath for greasy dust or dirt. No renewals of the filtering media are necessary, according to the manufacturer.

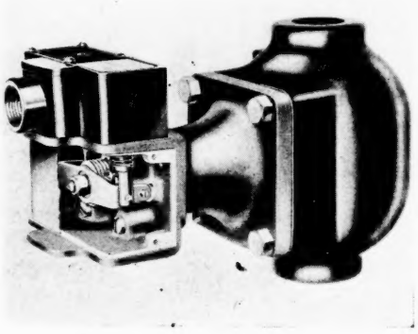
Filters are made up in standard sizes of 20 in. by 20 in., or 16 in. by 25 in., each having a filtering area of 400 sq. in. They are also available with filtering surface increased by V-shaped folds. V-type filters are made with effective filtering areas up to 9072 sq. in., for institutional and industrial applications.



Somers filters, flat and V-type

Low Water Control Switch

Detroit Lubricator Co., Detroit, has introduced the No. 257 low water control switch for steam boilers fired with oil or gas burners or stokers. The control stops the burner in case the water level falls too low.



Low water safety switch

The top of the control is connected to the steam space of the boiler, the bottom to one of the return pipes. The low water cutout is obtained by means of a float in the cast-iron casing, installed a few inches below the normal water line. The unit is regularly furnished with connections for BX and with 1-in. pipe connections.

G.E. Oil Burner Transformer

Class E radio interference-proof transformers for oil burner ignition have been placed on the market by General Electric, Schenectady, N. Y. They are available with secondary potentials of 10,000 and 12,000 volts for primary voltages of 100 to 140 and 200 to 240, and can be had equipped with either detachable plug-type or porcelain high-voltage terminals.

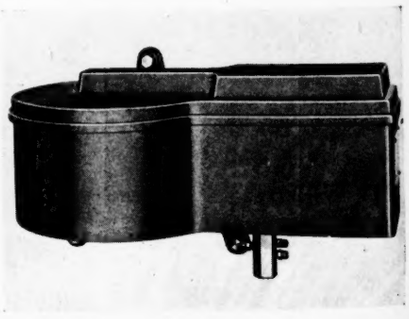
This transformer is not only electrostatically balanced itself, but makes it possible to install the remainder of the high-voltage ignition circuit with practically perfect electrostatic balance so that radio-frequency oscillations generated by the spark do not enter the primary supply lines, but pass directly to the ground through a neutral connection. Electrostatic shielding of the high-voltage coils and the plug-type connections, permitting the use of conduit-shielded cables further prevents radio interference and reduces likelihood of short-circuit and accidental shock.

Carrick Markets Draft Regulator for Medium-Sized Plants

Carrick Engineering Co., Michigan City, Ind., has developed the Type HF1 hydraulic draft regulator for moderate-sized heating and power plants. It can be applied to the control of dampers, fan motors, or ventilating pressures or drafts.

Similar in operating principle to the larger Type HF2, previously described in these pages, the new regulator controls valves, dampers, etc., with power from a hydraulic piston operating in a brass cylinder. This is controlled by a four-way valve actuated by a spun aluminum bell immersed in an oil seal. Draft pressure is communicated to the under side of the bell, above the level of the oil seal, and is counteracted by a beam balance, having an adjustable weight. The beam is balanced on stainless steel knife edges, and can be set for draft directly in inches of water, no gauge being required.

The brass hydraulic cylinder can be mounted in any position to permit direct connection to damper or valve, and is connected to the control valve through copper tubing. The outfit is shipped complete with mounting bracket, tubing, and connections.



Draft regulator for small boilers

$55,000 Petro Installation fires its vast power plant

One of the greatest achievements of the Petroleum Heat & Power Co. and of the oil burner industry

THE NEW YORK HOSPITAL—CORNELL MEDICAL COLLEGE ASSOCIATION... *Architects:* Coolidge, Shepley, Bulfinch & Abbott of Boston, Mass. *General Contractors:* Marc Eidlitz & Son, Inc., New York City. *Heating and Ventilating Engineers:* Buerkel & Company, Inc., Boston, Mass. 4 Walsh and Weidner Boilers, 800 HP each, operated at 200% of rating and at 200 pounds working pressure. 20 Petro oil burners. 120,000 gallons storage capacity for oil supplied by Petroleum Heat & Power Co.

This latest selection of Petro oil burning equipment is a matter of great pride to heating engineers who have been specifying Petro for many years.

For this job sets up another milestone in the progress of oil burning. The following facts explain why.

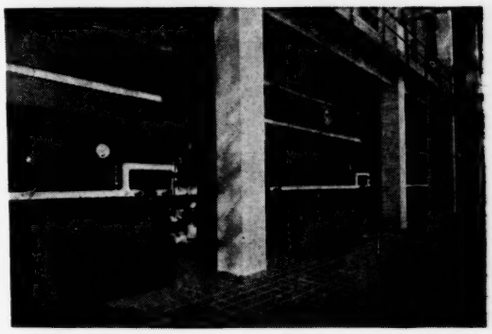
A power plant that must generate 400,000,000 pounds of steam and 6,000,000 K. W. hours of electricity each year is the last one on which to experiment. The health and comfort of 3000 persons are at stake. So vital is this one phase alone that practically every piece of equipment is either installed in duplicate or by-passed so that the possibility of a shut-down is negligible. The structure was built to last 100 years.

A control system has been installed that enables a single operator to handle the entire battery of boilers by a touch of a finger, shifting the load from one boiler to another or operating any portion of the plant at will.

Not only was oil storage capacity of 120,000 gallons provided for by 6 steel underground tanks, with emergency sidewalk fill lines for truck delivery, but also with an oil fill line extending 700 feet to the East River so that oil may be delivered by barge.

Petro oil burning equipment was selected because of its record. Consistently for years, it has proved that it pays for itself in buildings of every description.

As a public service enterprise, providing both the equipment and the fuel oil in our own trucks from our own oil terminals, our responsibility is undivided. This complete oil heating service is available throughout the Atlantic seaboard to every type of structure, regardless of its size or purpose, including large and small residences. This same equipment used in this 100% guaranteed oil heating service may be depended upon wherever it is sold.



With the touch of a finger a single operator can shift the load from one boiler to another or operate any portion of the plant at will.

For Heating Engineers

"We have been awarding contracts for oil burning equipment for many years and shall continue to advocate its use in all projects executed by this firm because of its cleanliness, efficiency and economy of operation.

"Your compilation of information on oil and oil burning equipment is clear and comprehensive. We will find it of great value as a ready reference in our future work."

Charles N. & Selig Whinston, Inc.
By Selig Whinston

FREE—Write for 24-page Bulletin G-1 that gives full details and specifications of Petro Model W, the leader in industrial and commercial installations.

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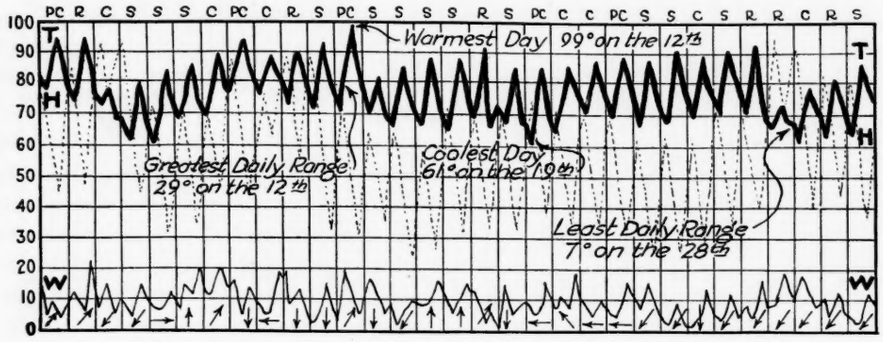
World's Oldest and Largest Oil Heating Organization

Manufacturers of a complete line of oil burning equipment for every type and size of boiler

Branch Offices: New York City, Boston, Providence, Philadelphia, Baltimore, Washington, Newark, Portland, Me., Detroit, Los Angeles, Tacoma, Portland, Ore.

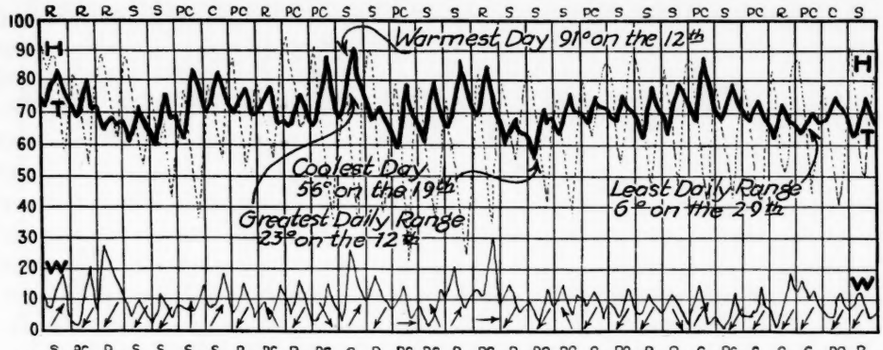
THE WEATHER FOR AUGUST, 1933

Plotted from records especially compiled for HEATING AND VENTILATING by the U. S. Weather Bureau. Heavy curves (T), temperatures in deg. F.; dotted lines (H), per cent relative humidity, from readings at 8 a.m., noon, and 8 p.m., except for New York, which shows hourly readings. Light lines (W), wind velocity in m.p.h. Arrows indicate prevailing wind directions. S—clear; PC—partly cloudy; C—cloudy; R—rain; Sn—snow.



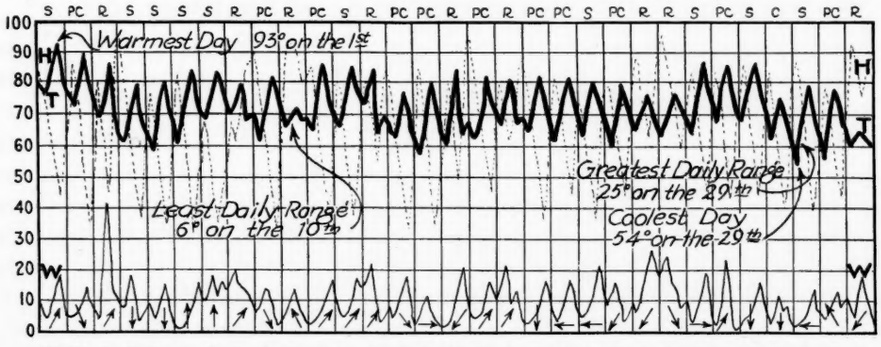
St. Louis

Mean temp. for month, 77.8°; aver. wind velocity, 9.0 m.p.h.; prevailing direction of wind, N.E.



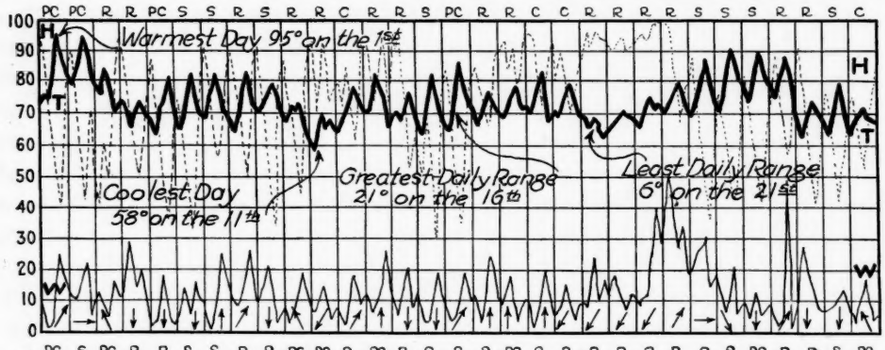
Chicago

Mean temp. for month, 71.4°; aver. wind velocity, 9.2 m.p.h.; prevailing direction of wind, N.E.



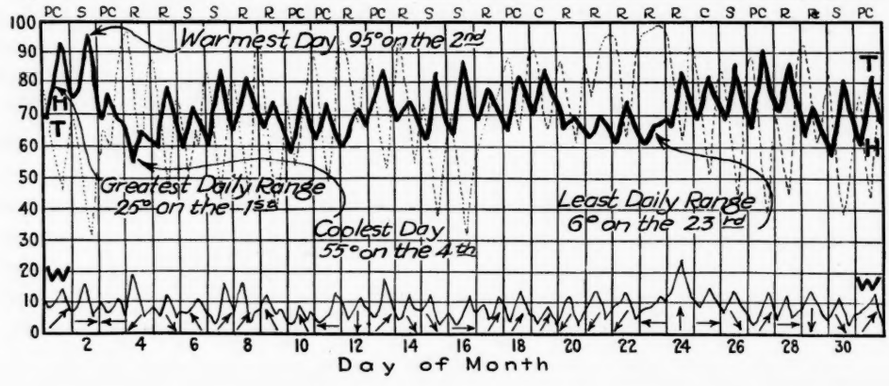
Pittsburgh

Mean temp. for month, 72.4°; aver. wind velocity, 9.1 m.p.h.; prevailing direction of wind, S.W.



New York

Mean temp. for month, 73.8°; aver. wind velocity, 11.9 m.p.h.; prevailing direction of wind, N.


Warmest Day 95° on the 2nd
Greatest Daily Range 25° on the 1st
Coolest Day 55° on the 4th
Least Daily Range 6° on the 23rd
2 4 6 8 10 12 14 16 18 20 22 24 26 28 30
Day of Month

Boston

Mean temp. for month, 71.8°; aver. wind velocity, 7.9 m.p.h.; prevailing direction of wind, S.W.

ALBERT KAHN..
pecifies *Wrought Iron*
r certain pipe services

Genuine Wrought Iron specified for all
ng and steam return lines in General
Truck Building, Pontiac, Michigan.

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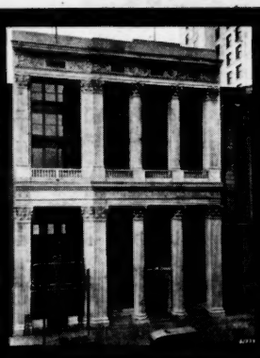

● National Bank of Commerce, Detroit. All heating lines of Byers Genuine Wrought Iron Pipe.

● Byers Genuine Wrought Iron Pipe specified for cold water, hot water, drainage, vents, fire system and all heating lines in Harper Hospital Addition, Detroit.

● Fisher Building, Detroit. All heating and cold water lines of Byers Genuine Wrought Iron Pipe.

PE selection is a matter of accurate engineering in offices of leading architects, such Albert Kahn, Inc., of Detroit. The probable rosive conditions of the piping services in each project must be analyzed and pipe materials cted which have proved themselves over g periods of time in older buildings jected to the same conditions. ought iron, for instance, is specified in e corrosive services where it has proved most economical over a long period of time.

Basing pipe selection on records of service and analysis of conditions is what we call "Pipe Prescription." Illustrated are examples of this sound engineering practice as carried out by Albert Kahn, Inc., Detroit

PUT YOUR FAITH IN SERVICE RECORDS

Blanket specifications are wasteful and not sound engineering. Be sure you have analyzed conditions and have accurate service records in your files to back your selections.

Our Engineering Staff is at your disposal in analyzing conditions. If you would like to review our files of comparative service records collected through the aid of architects and engineers, ask a Byers Engineer or write our Engineering Service Department. A. M. Byers Company, Established 1864. Pittsburgh, Boston, New York, Philadelphia, Washington, Chicago, St. Louis, Houston, Los Angeles.

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